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MANUFACTURE

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FOOD MANUFACTURE

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The Wheat Agreement

CONGRESS has let slip the chance that we should have a Wheat Agreement; and whether it will retrieve it or not remains, at the moment of writing, in doubt. The pity of it is that Canada and Australia had both accepted the draft agreement; and the importing countries, where they still waited, were clearly waiting only for the United States to take action. If there is no Wheat Agreement, there is even less likelihood of a sugar or a maize agreement. The progressives have, in fact, been driven back one ditch further than they anticipated. Early in 1947 it was evident that the idea of a World Food Board would have for the time to be abandoned; and the alternative of a series of Commodity Councils was then put forward by the Bruce Committee. They were unsatisfactory, in that they offered no chance of relating farm prices to one another and possibly to other commodity prices; but they were at least an experimental field in the technique of price adjustments.

In July Mr. Charles Brannan, the U.S. Secretary of Agriculture, was rather less reserved than usual in his comments on the failure of the Senate to ratify the agreement. All the farm organisations, he declared, had supported the agreement; it was opposed primarily by the grain trade and milling interests. In his view the inevitable scramble for long-term bilateral agreements that is bound to follow would seriously limit America's opportunity in foreign markets. "This," added Mr. Brannan, "is an outstanding example of the irresponsibility of Congressional leaders. It is policy making by default."

There is no question that these strictures are in some measure deserved. Brannan and his predecessors not only took a leading part in working out the terms of the agreement, but they had on an earlier occasion persuaded the nations to accept the commodity agreement solution of their difficulties. They have every right to feel sore. Without an agreement of this nature the adjustment of American wheat production is going to be an arduous task; and whether or not the Senate remembers, the Department of Agriculture has not forgotten the experiences of the 'twenties. In 1921 U.S. wheat exports exceeded seven million tons; in the decade of the 'thirties they had fallen on the average to less than one and a half million tons. That level was achieved only by the aid of export subsidies.

As for Britain's share in the transactions, we are at the moment secured by our Canadian and Australian agreements; but these will not continue indefinitely. The world needs a few such "cushions" as are provided by the draft agreement; and without them it is difficult to see how the markets will escape a general feeling of insecurity.

Sugar Factory Expansion

For many years the production of sugar beet in Great Britain has been limited by the capacity of the eighteen sugar factories. Before the war, production was, in fact, restricted by international agreement. Since the cessation of hostilities proposals have been advanced from time to time for the provision of an additional factory, to be situated in the South of England. The reason for this suggested location is that some 100,000 tons grown annually in the south-eastern counties, and 40,000 tons grown in the south-west have to be transported long distances to one of the existing factories. Sussex and the West of England have been suggested as suitable locations, but the project has made little or no progress, mainly because of the inability to build and equip a new factory under present conditions.

Work has begun, however, on an extension of the Peterborough factory, and it is hoped that by the end of the year additional machinery will have been installed to increase the throughput of the factory by 400 tons a day. The 1948-49 sugar manufacturing season will be virtually ended, however, by the end of December. For each of the next two seasons it is hoped to expand the throughput by a further 800 tons a day, making a total increase of 1,000 tons daily for the 1950-51 season. New machinery is also being installed in the King's Lynn factory.

The sugar beet target fixed by the Ministry of

Agriculture for England and Wales next year is 391,700 acres, compared with 392,200 acres this year; 424,900 acres in 1946; and a pre-war average of 337,700 acres.

Although the tonnage of beet delivered to the factories during the 1947-48 season was only 2,959,564 tons, against 4,522,140 tons (an exceptionally heavy crop) in 1946-47, the sugar content averaged 17·99 per cent. last season against 15·95 per cent. in 1946-47.

In Holland, where sugar beet has been grown for many more years than in England, farmers usually grow 30,000 plants per acre and obtain a higher sugar content than do our own farmers, who usually grow only about 20,000 plants per acre. A Dutch expert has expressed the view that the sugar content of British beet would probably be increased if the number of plants were raised to 30,000 per acre.

Milk Condensation by "Squeeze-Drying"

Known as the Mantle process, a new method of dehydration has been developed in the United States. Combining a freezing and compression technique, the process can be operated continuously rather than on the batch system. It is not a method of complete dehydration, but it will remove about a third of the volume of an aqueous solution without losing more than 1 per cent. of the dissolved materials. Skimmed milk, for example, has been concentrated from a total solid content of 9·4 per cent. to one of 25·01 per cent. The principal merit of the new method would seem to be its application to concentration problems with heat-sensitive materials, but it may well be of interest to the milk industry as an alternative to present processes of vacuum evaporation.

The original aqueous liquid is frozen solid. The frozen mass is then put through a crusher mill and fed through a hopper into a screw-type or compression press. At the same time there is a controlled heat transfer, which, in combination with the pressure, causes the liquefaction of the lowest melting-point materials in the "ice"—these being the eutectics or solid solutions which have been formed in the original freezing operation. The liquefied fraction passes out of the press and the still solid and true ice fraction is discharged separately since it cannot flow through the press. Almost pure ice is left behind, although obviously not all the water in the original solution can be separated in this way. The higher the pressures applied the higher the concentration, but running costs increase so that for most materials there is an economic point of balance.

The Mantle process should not be confused with the more familiar freeze-drying process in which the solution is frozen and the water then removed by vacuum evaporation. This method calls for much more expensive equipment and is much more cumbersome to operate, although it will produce dry powders where the Mantle process can only produce concentrated solutions. According to an American report the process has so far been used for skimmed milk, apple and orange juices, and penicillin. It is more fully and technically described in U.S. Patent No. 2,424,663.

The Export Guarantees Scheme

The Export Guarantees Act, 1948—an agreed Act of all parties—increases the amount available for the Board of Trade as capital for the giving of guarantees against possible loss in export trading, and is one of several Acts which have been passed since the scheme's introduction by the Government of 1919. The scheme is really an insurance, but other information is available from the Export Credits Guarantee Department, as regards foreign firms, type of trade likely, and business possibilities generally.

The insurance policy mostly used is the E.C.G.D. (Contracts) Policy, and this covers practically every possible cause of loss in connexion with export trading, the matters covered being as follows:

(1) Possible losses through the insolvency (or protracted default in payment) of the buyer.

(2) Through exchange restrictions or a shortage of exchange in the country of the buyer which may prevent the transfer of sterling to the U.K.

(3) Through war preventing payment or through war, civil commotion or other disturbance in the buyer's country.

(4) Through the cancellation or non-renewal of an export licence or the imposition of restrictions on the export of goods not previously subject to licence.

(5) Through additional handling, transport, or insurance charges by an interruption or diversion of voyage outside the U.K. which are not easy to recover from the buyer.

(6) Cover against losses incurred through any cause outside the control of the exporter or buyer from events occurring outside the U.K.

Under this policy, up to 85 per cent. of the contract price is payable in respect of insolvency or protracted default in payment. Furthermore, there may be other sums received subsequently (*e.g.* from buyer's estate), 15 per cent. of which would come to the exporter, 85 per cent. to the E.C.G. Dept., the division being according to the risks covered by the respective parties.

The insurance may cover all the exporter's

foreign trade or for certain markets only. Markets can be omitted where the exporter is prepared to take on the risks himself, but the business offered must be reasonable and not merely a single transaction on one market with one shipment. In these cases the premium would naturally be at a higher rate than where the whole of the export business is insured.

If the trader does not wish to cover any risk of loss prior to shipment, another policy can be used —the Shipments Policy—(the premium for which is lower than under the full policy), under which only shipments are declared.

Premiums are bound to be different, being according to the particular country of export and the risks involved, and these may vary from a premium as low as 5s. to as high as 40s. per £100 of turnover, but if the amount is reasonable, the premiums may work out on average at £1 per £100 of turnover or even less.

Apart from goods, a guarantee can cover the execution of works or services outside the U.K., including the provision of labour or materials, so the cost of installation of machinery or plant, erection of buildings can be covered. Included also can be fees of experts and consulting engineers, the cost of training employees abroad, all these matters being accepted as helping to establish or encourage exports, which requisite is a provision of the Acts.

Sales by merchants and sales from stocks abroad can be covered by a guarantee. United Kingdom merchants can cover raw materials and primary products produced abroad and shipped from one foreign country to another such country without coming here (or by *entrepôt* trading, as, for instance, through the *entrepôt* port of London). Special contracts may be issued to cover capital goods, machinery plant and equipment, being according to the individual circumstances of the particular exporter, but even so these are ordinarily based on the standard contracts policy.

A point of interest is that a policy is useful as an instrument of finance, a holder being in a favourable position for obtaining an advance, or discounting facilities, from his bankers.

Cider Apple Shortage

The fact that the demand for their product is increasing, while the home production of cider apples is tending to decline, is causing some concern among cider manufacturers. If the industry has to rely every year on imported fruit juice a serious position may occur. Government approval of such imports might be refused, particularly if the balance of payments with the countries concerned (usually France) were against us. British manufacturers' requirements of apples are estimated at nearly 125,000 tons annually, including a limited quantity of culls of dessert and cooking varieties. In addition, the demand for cider apples for the manufacture of apple juice may reach 7,000 tons by 1949.

The average pre-war production of cider apples was estimated by the Ministry of Agriculture at rather more than 66,000 tons, or little more than 50 per cent. of the industry's present requirements. The 1944 fruit census showed that the number of cider apple trees in England and Wales was then only 2,191,700, of which 1,925,900 were over nine years old, and 265,800 were young trees. A proportion of the older trees are stated to be in poor condition.

The four-year plan for horticulture announced by the Ministry makes no mention of cider apples. Manufacturers consider that Britain should produce all the cider fruit required to meet the national requirements in full, and that it should not be necessary in a normal season to have to spend foreign exchange on imported supplies.

Mushroom Soup Without Mushrooms

Some preliminary experiments by Dr. Harry Humfield of the U.S. Department of Agriculture published in *Science* (1948, **107**, No. 2780) concern the production of mushroom soup and other mushroom flavoured products without mushrooms.

Mycelium of mushrooms grown in a liquid medium made of such cannery wastes as asparagus butt juice or press juice from pear waste may be used in mushroom dishes. Good yields of mycelium can be obtained by this technique, the product being found to have the characteristic mushroom flavour. It seems possible that production in submerged culture may have application, not only in the manufacture of mushroom soups, gravies, and flavourings but also in the production of spawn for seeding commercial mushroom beds.

The mycelium was separated from the culture liquor by centrifuging, suspended in water and again centrifuged. The samples made up in the preliminary work were dried from the frozen state. Yields of mycelium have been obtained up to 60 per cent. by weight of the sugar consumed. The authors consider that no serious difficulties should be encountered in adapting the process to commercial production of mycelium, although it was stressed that the commercial phases of the experiment are still in the preliminary stage.

More Fertiliser—More Food

The place of fertilisers in our national economy was discussed in a paper read recently to The Fertiliser Society by Dr. Ogg, director of Rothamsted Research Station. He showed that we are still surprisingly conservative in our use of this not very recent technical development; even the evidence so far accumulated over the years has not been fully appreciated.

Before the invention of modern chemical fertilisers, various estimates of wheat yields show a national average of 21 bushels to 24 bushels per acre; by 1894 this average figure had risen to 29½ bushels and the figure for recent years is 34½ bushels. But at the Rothamsted farm, where sulphate of ammonia is used at twice the average or normal rate for the country (though other fertilisers are used only at average rates), the yield over the past ten years has averaged 50 bushels. A similar increase has been shown on this farm for the other cereal crops; barley, for example, yields 73 bushels per acre as against a contemporary national average of 47 bushels. Indeed, from this and other evidence Dr. Ogg was able to show that the Ministry of Agriculture's target for 1951-1952 of a 15 per cent. increase in output over the war-time peak figure could probably be obtained solely by increases in rates of application of fertilisers and lime.

Because we have since 1940 used fertilisers much more intensively than in pre-war years it is often assumed that we have made substantial progress in this direction. This is not correct unless we take a very low standard as the basis for measuring progress. In 1936 we were using rather less than one-sixth of the amount of fertiliser nitrogen that Holland used per arable acre, and even now we use only about one-third of this Dutch standard of pre-war days. One reason for this is, of course, that there is a world shortage of nitrogen, but this is not the whole story. On many farms the desire to use fertilisers is casual, and dressings would be well below the optimum rates even if supplies were available in abundance. This is particularly the case with the smaller farms; Dr. Ogg quoted statistics showing that arable farms over 300 acres in size used over twice as much fertiliser per acre as farms up to 50 acres in size. It is true that small farms have larger supplies of farmyard manure available, but where manure is substantially used the responses from fertiliser application are generally more pronounced than where manure dressings cannot be frequently given.

Producing more fertilisers and at the same time ensuring that farmers utilise these supplies to the fullest advantage is still one of our most urgent national problems. Unfortunately what has so far been achieved is insufficiently realised in many influential quarters; still less is it appreciated what *could* be done. Can we afford a slow and steady pace of progress at a time when maximum production of food from our own soils becomes more urgent each month? The productive capacity of the fertiliser industry in Western Europe has declined tragically as a result of the war; our own capacity has, more fortunately, at least doubled. But it is not yet nearly enough, nor does the vision of our "planners" seem big enough. There are potash and phosphate deposits within Western Europe's economy and nitrogen can be "fixed" from the air; the greatest possible expansion of fertiliser production should be a top-level priority in both our own and Europe's recovery programme. Certainly figures show that impressive increases in fertiliser production and use have been achieved in Britain since the war—the danger is that we should rest content with reaching "targets" that are well below the established technical possibilities. Which project will matter most to Britain's economy by 1951 or 1952—the Brabazon air-liner or a new plant for the fixation of atmospheric nitrogen? Is it so certain that in a country rich in sodium salt deposits there are not potash salt deposits to be discovered? Certainly it would be worth hazarding a few hundreds of thousand pounds on modern mineralogical investigations towards this end.

Dinner on the Railway

One day last June on board a British Railways express train we had the worst meal in our experience. To enumerate the shortcomings, both in quality and quantity, of the menu would be a dreary business—to a large company of British travellers, and also those from overseas, they are only too familiar. And yet, patient people that we are, complaints exchanged between themselves rarely reach the proper quarters.

With the memory of that and other meals, we were intrigued by the news about the British Railways Hotel and Restaurant Executive, the five members of which will be covering every restaurant car in the country. We were interested also to hear that the one woman member of the Executive was Mrs. Ella Gasking, the recently retired chairman of Bachelor's Peas, Ltd. Here is a case of an expert in the right place. Mrs. Gasking will certainly earn our gratitude if she can do anything about those railway meals.

Herring Canning

The work dealing with fish canning at present being carried on at Torry Research Station is part of a more extensive programme which is to be carried out in the Clyde area, where a pilot-scale cannery is to be operated by the Herring Industry Board. In this connexion a laboratory is to be established by the British Food Manufacturing Industries Research Association, where research and development relating to the canning of fish will be carried out. Two main objects will be served, namely an investigation of suitability of Clyde herring for canning and other related processes and the development of improved methods of herring canning. The canning of other species of fish such as mackerel, white fish, and shellfish will also receive attention.

DURING the past year certain phases of the investigation of the suitability of Clyde herring for canning have been developed by Mr. E. P. Sidaway of the Research Association staff at Torry Research Station, Department of Scientific and Industrial Research, where laboratory facilities have been made available. Using herring brought over from ports on the Firth of Clyde, research has been concerned mainly with methods of processing and the concoction of sauces designed to produce a pack superior in flavour, appearance, and carrying quality to that at present manufactured, and alternatives to the tomato sauce used extensively in the industry have been sought.

While searching for new and more appetising recipes the cost of production has been kept in mind. Several methods of packing have thus been evolved which, while not adding materially to the cost of the finished product, are considered to be improvements on the present commercially canned herring.

The usual sauce employed is a diluted tomato *purée* which is normally placed in the can before the fish are packed. Due to the variability of the *purée* obtainable the appearance on out-turn is often marred by a brown discoloration of the sauce which becomes diluted by the liquor exuding from the fish during processing.

To overcome this disadvantage compound sauces were tried containing varying amounts of edible oil as well as acetic acid, spices, and some suitable emulsifying agent. These sauces had a smoother consistency, a brighter colour, and more attractive flavour, the latter free from the metallic taste often encountered in ordinary tomato *purée*.

In order to eliminate the excess of aqueous liquor in the cans after processing, a number of treatments were tried. These included air drying the fish before packing, and steaming it on trays.

Dressing Methods

Dressing of herring for canning is accomplished by means of a nobbing machine. This severs the head and pulls out the main gut, leaving the milt and roe in position, which operation may be carried out by hand. While the machine may remove the gut efficiently, a certain amount of extraneous

Experiments are being made to discover more palatable sauces to replace or supplement the tomato which is more commonly used in herring canning.

Tenter racks of herring being weighed and placed in an automatic smoke kiln. *Photos. courtesy "The Times."*

material, such as blood, remains in the body cavity and on processing turns an ugly brown colour. Even careful hand nobbing does not overcome this defect. The obvious remedy lies in filleting the herring, and though this may appear to entail a high loss, the improvement in the finished pack from the standpoint of appearance and flavour should offset this. Since the bones are removed, the processing time may be reduced with a consequent improvement in flavour. Machines are available which will carry out the operation of heading, gutting, and boning—that is, in effect, filleting efficiently.

Another simple refinement in the way of dressing the herring, which improves the appearance and makes filling easier, is the removal of the tail of the herring. This can be done easily where hand nobbing is practised, but the machine usually employed for this purpose would require adjustments in order to remove the tail. On an average sample of Clyde herring cut to a standard length (for a 7 oz. oval can) the weight of tails amounted to 1·5 per cent. of the round fish.

Variations in Drying Technique

Reference has been made to the air drying of herring previous to canning. While this method is effective in reducing the water in the can and firming the fish, the steaming process is equally effective and is more adaptable to ordinary cannery procedure. Smoking on the other hand, which may be considered as a modification of air drying, produces a desirable flavour in the finished pack. Canned smoked herring, kippers, or kipper snacks as they are usually termed, are produced in considerable quantities. In most cases the smoking is carried out in the standard type of smoking kiln where careful control is difficult. A standard pack under these circumstances is almost impossible to attain.

Smoked packs have been experimented with, using the Torry Research Station smoking kiln. With this type of kiln it is possible to control both temperature and humidity. It was found possible to produce a standard pack of smoked canned herring and one with a more attractive flavour and appearance than the average commercially canned pack when this kiln was used.

"Pasteurised Herring"

Perhaps one of the best packs so far developed is a modification of the well-known Bismarck herring. Normally marinated herring is a very unstable material, but by subjecting it to a form of pasteurisation the keeping quality can be extended indefinitely if the cans used are suitably lacquered.

In the future it is hoped to extend this work to include further phases such as the effect of filleting and of acid sauces on processing time, the relation of methods of storage and transportation, and state of maturity to the quality of the final product.

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

How to Feed Athletes

The choice of London for the recent Olympic festival focused the attention of British food experts on the importance of diet in enabling athletes to give their best performance. A good diet is obviously no less necessary for coal miners, steel workers, and other heavy manual labourers whose work is vital for the national interest. A conference on the feeding of athletes, arranged by the Nutrition Society with Professor J. R. Marrack, M.D., D.S.O., as chairman, therefore attracted considerable interest among food chemists, dietitians, and medical men.

THE functioning of muscle is such a commonplace phenomenon that the ordinary man seldom pauses to think about it. Yet even the simplest movement depends upon miracles of co-ordination, involving electrical impulses, osmotic pressure changes, and biological oxidations. These complex inter-relationships, compared with which the workings of a jet aeroplane or television set are child-like in their simplicity, have been studied by physiologists and biochemists with considerable success. According to Mrs. Dorothy Needham, F.R.S., the muscles use the conversion of adenosine triphosphate to the diphosphate as their immediate source of energy. A complicated chain of reactions and side reactions, involving creatine, lactic acid, and many other metabolites, then leads back to the oxidation of glucose as the mainspring of muscular activity. In attempting to explain the mechanism by which the muscles alternately stiffen and relax, the fact that adenosine triphosphate has a marked effect on the viscosity of the muscle proteins, myosin and actin may be helpful.

Oxygen Consumption

Success in athletics, if we assume equality in physique, skill, judgment, and determination, will come to that athlete in whose muscles the biochemical reactions for obtaining energy are most rapidly and efficiently carried through. Dr. Phillip Eggleton has reviewed the factors which are concerned, particularly in regard to the rate at which oxygen has to be absorbed from the atmosphere to support the combustion of glucose.

The effect of training is to enable the tissues of the athlete to produce energy at a much greater rate than is possible in untrained individuals, while the heart and lungs also supply oxygen at much above the normal rate. These two activities, however, are not completely correlated, and while the muscles of the Olympic athlete may metabolise at 100 times their resting level his efforts to obtain oxygen cannot keep pace. His body is therefore faced with a different problem according to the duration of the contest which he has undertaken. The sprinter runs for 100 yards presumably at the expense of turning the glycogen, or animal starch, of the muscles first into glucose, and then into lactic acid. This reaction avoids the necessity of absorbing oxygen during the race, but an "oxygen debt" is incurred. When he has passed the tape, therefore, the runner breathes heavily for some minutes until he has taken in enough oxygen to convert some of the lactic acid in his muscles to carbon dioxide, while changing the rest back to glycogen.

The prolonged presence of lactic acid in the system, however, leads to fatigue and inefficient working of the muscles. The long-distance runner, therefore, cannot afford to accumulate a large oxygen debt, and must moderate his speed so as to keep a reasonable balance sheet between the combustion of glycogen and the absorption of oxygen. If his race is very prolonged he may seriously deplete his reserves of glycogen, and the provision of food in a readily assimilable form becomes desirable.

Food Requirements

Opinions as to the quantity and quality of food required by athletes are conflicting. According to a German report the average consumption of the 4,700 competitors in the 1936 Olympic games at Berlin was equivalent to 7,300 Calories daily. The diet provided contained three times as much protein, five times as much fat, and one and a half times as much carbohydrate as were considered appropriate for an ordinary individual in pre-war days. Meat was the favourite foodstuff, and about 1 lb. of beef steak twice daily was considered a reasonable allowance.

Sir Adolphe Abrahams, however, considers that these figures grossly exaggerate the requirements of the average athlete. In observing the dietetic habits of several British teams he has found that the men eat only reasonably large amounts of ordinary dishes. It is also a fallacy to suppose that the actual work done by athletes while training in itself necessitates a greatly increased food supply.

In their visits to the track for practice sprinters use up no more than 400 Calories daily, equivalent to just over ¼ lb. of sugar. Long-distance runners, it must be admitted, use up much more energy than sprinters in their training, but they are usually lightly made men and eat relatively little food.

Stimulating an Interest in Life

It seems probable, therefore, that a liberal meat diet is particularly required by athletes such as sprinters, weight lifters, and wrestlers, in whom speed or sheer strength count for more than stamina. Presumably the main purpose of a heavy food intake is to build up muscles adequate for the task in hand, rather than to supply fuel, but psychological factors have also to be considered. Strict training may be a tedious business to athletes of the more "temperamental" type, and a liberal meat diet may give them an interest in life, and prevent the "staleness" which may easily result from boredom or excessive worrying. Sir Adolphe considers that a little beer and an occasional bottle of champagne may sometimes be admissible for the same purpose.

The Value of Vitamins

Vitamin B_1 is concerned in the metabolism of glucose, and therefore may be considered to play a prominent part in muscular activity. There is also evidence that nicotinic acid and several other members of the vitamin B complex may be less directly concerned. Many observations have been made on the effect produced on the strength and endurance of volunteers doing heavy work when they are dosed with B vitamins. On the whole the results of these experiments have been inconclusive and conflicting, but a paper by Lady Frankau on the improved athletic performance of airmen after dosing with nicotinamide has attracted considerable interest. Experiments have also been carried out on the effect of deprivation of vitamins on muscular activity, but usually deterioration has only been observed when the deficiency has become so severe as to be obvious by other signs.

It is quite clear, however, that the intense muscular exertions of the trained athlete are associated with periods of greatly increased metabolism, which might be expected to make heavy calls on vitamins and other nutrients needed by the muscle cells. According to Dr. Geoffrey H. Bourne, the dosing of all members of the British Olympic team with B vitamins would have been fully justified as a precautionary measure.

Catering for Athletes

In the opinion of Dr. Neville Leyton, the tendency in the past was for athletes to include too much protein in their diet. He recommends a varied diet containing a reasonable amount of meat, but including plenty of vegetables and fruit. The amounts of food eaten by individuals training for the same event vary considerably, so that it is difficult to standardise dietary requirements. Milk should be consumed liberally, but tea and coffee are best omitted

The need to discard old-fashioned ideas and prejudices has also been stressed by Professor Marrack. We should now know better than to advocate diets similar to those recommended many years ago by the great Alfred Shrubb, which seemed to aim at excluding all sources of vitamin C as a matter of principle! One very important point is that the diet should be easily digested, since no one can hope to shine as an athlete while suffering from stomach ache or flatulence. Provided there is no difficulty in digestion, however, undue importance should not be attached to conventional prejudices against certain types of food. If the athlete enjoys pastry, and digests it well, it is most unlikely to interfere with his performance on the track.

The Day of the Race

In "building up" the competitor during training, therefore, adequate amounts of a good and varied diet are to be recommended. On the day of his event, however, he must obviously be more particular about what he eats and when he eats it. Most athletes prefer to compete on an empty stomach, and take no food for three hours before their contest is due. Others find that they may feel faint or vomit if they have gone so long without food, a weakness which is probably caused mainly by the intense nervous strain.

In such cases some easily digestible form of nutriment may be advisable, and cane sugar, glucose, or candy may be favoured. All these forms of carbohydrate provide energy in readily available form, although at this stage of the proceedings it is doubtful whether food is required other than for psychological reasons. After the athlete has competed in an exhausting event, however, he may sometimes experience a strong desire, well known to mountaineers, to eat or drink something sweet. Presumably this desire is based on the exhaustion of glycogen reserves, with a resulting fall of the level of glucose in the blood.

The Need for Glucose

Some convenient form of carbohydrate is therefore desirable for use by athletes both during very prolonged events, such as walking races, and also between events run on the same day. For this purpose glucose is perhaps to be preferred to cane sugar. It is somewhat less sweet and, according to A. L. Bacharach, may be taken in large amounts without unpleasant after-effects. Dr. R. D. Lawrence has mentioned that glucose tablets of the type carried by diabetic patients are very suitable for athletes, but apparently the Olympic competitors had difficulty in obtaining adequate supplies.

Freezing Preservation of Fruit Juices

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Freezing preservation provides an effective means of preserving the fresh flavour, colour, and aroma of fruit juices for a considerable period of time, provided it is properly applied. In this article the author outlines some of the procedures that should be observed in preserving fruit juices by freezing storage, using orange juice as an example and indicating briefly the recommended procedure for several other juices.

At present most fruit juices marketed in the United States are preserved by pasteurisation in bottles or in canned form. Some fruit juices retain sufficient of their fresh flavour and colour to make quite satisfactory beverages when preserved by heat in hermetically sealed containers. On the other hand, certain other juices deteriorate during pasteurisation and lose much of their fresh quality during storage in warehouse and on the grocer's shelves. Orange juice is a good example of such a juice; lemon juice and lime juice are others. Canned and bottled grapefruit juice, Concord grape juice, and to a less degree canned or bottled apple juice retain sufficient quality to be commercially successful when preserved by heat.

Frozen Orange Juice

Not all varieties of oranges are equally suitable for freezing preservation in the form of juice. For example, the Navel variety as grown in California yields a juice that turns bitter soon after extraction from the fruit, while the Valencia variety's juice does not become bitter, even after several years' storage in the frozen condition. Consequently, the Navel variety is not used for commercial juice production, although it is used in the home and in fruit juice stands for preparation of juice to be consumed at once. The Valencia is used for preparing juice for canning and for freezing.

While orange juice preserved by freezing is far superior to the canned product, nevertheless it has not attained much industrial importance. This is probably because of its higher retail price and difficulties of distribution, and also because in 1945 and 1946 a great deal of inferior orange juice was packed by inexperienced producers who did not properly pre-treat the juice and who packed it in cardboard cartons, which are not suitable containers for the purpose. Much of this inferior juice has been a drag on the market and has given a bad name to the product.

As a result of commercial experience of various producers and of experiments conducted at California University, the following procedure is recommended for the preparation, packaging, and storage of frozen orange juice.

Ripe Valencia variety of oranges or other variety of proven suitability should be used. The fruit should be delivered in boxes to the juice plant as soon after picking as possible; the fruit should not be handled in bulk in dump trucks because much of it will be bruised and thus rendered unsuitable for juicing.

A flash heater and cooler for fruit juices.

At the plant the fruit should be used very soon after delivery, because on storage it becomes stale in flavour, and much of it will become mouldy.

The juice should be reamed (juiced) from the fruit after washing and halving. Washing is extremely important. It is customary in most California freezing establishments first to sort the oranges on a broad, slowly moving belt to remove any unfit fruit. They next travel through a soaker tank of water containing a powerful disinfectant such as Roccal to destroy moulds, yeasts, and other organisms on the skins of the oranges. In at least one plant the solution is applied hot. From the disinfectant solution the oranges pass through a washer consisting of several successive sets of sprays and revolving sets of cylindrical brushes operating in sprays of water, from which the fruit emerges shining clean. It usually travels *via* conveyor a sufficient distance to lose most of the adhering wash water, and then goes to the size-grading machine, if Brown juice extractors are to be used. It is then cut in half by a revolving circular knife. If it is to be reamed by hand, size-grading is unnecessary. However, in most plants automatic juice extractors are used; in only very small plants is hand reaming employed.

Treatment of the Juice

In the Brown juicer the halved fruit is automatically placed on rapidly revolving stainless cones of the proper size for the size of fruit being reamed. The juice and a considerable amount of pulp are extracted and are transported by pump, or flow by gravity, to the juice strainer or "finished." This may consist of a perforated stainless steel cylinder in which revolve brushes that rub the juice through the small holes in the cylinder much as tomato catsup is "finished"; or may consist of one or more fine, horizontal, very rapidly vibrating screens that effectively separate the juice from the coarse pulp and seeds.

The juice is next subjected in a continuous stream to a very high vacuum that removes most of the dissolved and occluded oxygen.

In so far as the author is aware, most packers omit a step that has been found very desirable at California University: flash pasteurisation at about 195° F. to destroy the enzyme or enzymes responsible for the "curdling," clotting, or granulation of the juice during freezing storage and subsequent thawing. Heating to the above-mentioned temperature for about thirty to sixty seconds, followed by continuous cooling to room temperature or below in stainless steel equipment is recommended.

In most California plants the deaerated juice is packed in the final containers without flash heating. It is, however, precooled to near the freezing point before packing. Enamel-lined tin cans are the preferred containers. These are filled in vacuum or are vacuumised before sealing and are sealed also in vacuum to exclude oxygen from the juice to the greatest possible extent. Glass jars have also been used very successfully, but juice packed in Cellophane bags inside cardboard cartons has not been found satisfactory, as they admit oxygen, allow drying out, and are rather "messy" for the consumer to thaw and handle after thawing.

The juice in cans is quick frozen, usually in a continuous Finnegan type freezer filled with highly refrigerated alcohol (propyl alcohol usually, or denatured ethyl alcohol) at −35° F. to −40° F., freezing time being about forty-five minutes. The frozen juice is stored at 0° F. or lower until shipped in the frozen condition at freezing temperature to the distributor.

Uses and Developments

At present much, probably most, of the frozen juice is distributed in No. 10 cans to large users, such as steamships, hospitals, hotels, and restaurants. Relatively little is seen in retail stores.

Frozen juice, properly prepared and served soon after thawing, is an excellent product. Its disadvantages are that it must be thawed before serving and costs more than the juice preserved by sterilisation by heat in cans.

An attempt is now being made by Florida producers (possibly also by one California company) to market a frozen mixture of orange concentrate and fresh orange juice of about 45° Balling, or one of similar density made by partial freezing and centrifuging to remove ice crystals. In the former product the concentrate is made by evaporation by heat *in vacuo*; fresh juice is then added partially to replace the fresh flavour lost in processing. The consumer merely adds water to taste and serves. The product does not freeze up solid, so it mixes well with added water and the cold syrup cools the drink.

In our experiments we have blended orange concentrate, lemon syrup, and grape juice to give a red syrup suitable for dilution for serving as an unfermented punch.

Lemon and other Syrups

Lemon juice retains its flavour better and is less apt to curdle if it is sweetened to about 50° to 55° Balling by the addition of cane sugar. On dilution to about 10° to 12° Balling an excellent lemonade is obtained, already at about the right temperature for serving. We believe that it has possibilities, as it keeps well in freezing storage, either in paraffin-lined cardboard cups or in glass or tin containers.

Grapefruit and orange juices make a pleasing blend for freezing, as do apricot and orange, apple and orange, apple and grapefruit, prune and apple, prune and grapefruit, and pineapple and grapefruit, or pineapple and orange.

(*Concluded on page* 407)

Diet Therapy

THERE have been so many books on food and nutrition written for different readers which have failed to give a sound scientific treatment that it is a pleasure to come across an exception. A recently published book* attracts because the author, from a wide experience in nursing, tutoring, and technical college teaching, as well as examining for the General Nursing Council, reviews successfully what a doctor of wide experience might have written had he the time and the ability. One-third of the book covers normal nutrition, that is normal diets from infancy to senility, a section which is admirable in its succinctness. Then, in a juxtaposition which enhances its value, we find in the remaining two-thirds a full yet closely knit survey of diets for all the ills we mortals may suffer at some phase or other in our lives.

In reviewing normal diets the author gives briefly a useful picture of proteins, carbohydrates, fats, minerals, and vitamins, as well as including a chapter on beverages. With but brief space available for these, it would not be fair to cavil at lack of odd details. References to new or old views on enzymes do not appear; for example, one finds "peptic ulcers" and "peptonised milk" but not "pepsin" in the index. There are also one or two flaws common in books for the non-specialist: like "galactose" given as "a constituent of milk sugar," or carbohydrates defined as "relatively simple compounds of carbon, hydrogen, and oxygen." The purist in English will certainly raise his hands in horror at "combusted" as a past participle. But the chapter on vitamins is all one could wish for in a book of this type or size. There are one or two striking remarks, like the one criticising the idea that tannin has a hardening effect on proteins and therefore tea should not follow a meat course, and that "it has never been suggested that tea should not be taken with fish or eggs."

Part II of this work, boldly facing the fact that the dietitian is hampered in his choice of special diets by food shortages and restrictions, sets out clearly and efficiently the present position in what is known as "diet therapy." Beginning with standard or "routine" types from "fluid diets" to "full diets," we hear of a surprising number of special diets for diseases or ailments. Here it is that the food manufacturer will find what is required in the way of fruit juices, malted products, junkets, custards, and other preparations. Although the book was written primarily for nurses and hospital staffs, others should benefit from reading it, particularly those who find a too intensive treatment of academic scientists or dietitians rather hard going.

A section coming later deals with cookery for invalids; with boiling, stewing, steaming, and their effects on different foods, as well as dealing with broths, soups, various egg dishes, and a variety of sweet dishes—all of which suggest that the lot of the invalid need not be too dismal.

The book is easy to read despite the rationing of printing space, which results in too concise or superficial survey of methods of food preservation. In times when standards of provisioning and cooking in hospitals have been criticised, this work, whether for hospital or home, is commendable now that food for the invalid and for old age calls for variety to break monotony in the daily round.—M. S.

* *Nutrition and Diet Therapy*. By A. E. Pavey. Pp. 304. London. Price 12s. 6d. net.

Freezing Preservation of Fruit Juices

(*Concluded from page* 406)

Red plums give a good beverage base for freezing by the following procedure. The plums are covered with water in a jelly kettle and heated to 180° to 190° F. until soft. They are then strained through coarse cloth and pressed. The juice is cooled and treated with pectic enzyme for twenty-four hours, racked, filtered, sweetened to about 30° to 35° Balling with cane sugar, and stored at 0° F. It is diluted with an equal volume of water before serving.

Loganberries, blackberries, and currants may be crushed, heated to about 180° F., pressed, cooled, treated with pectic enzyme, filtered, sweetened to about 35° Balling, packed, and frozen. The juices are diluted to taste before serving.

Apple juice direct from the press keeps well in the frozen state, or it may be clarified with pectic enzyme in the usual way and filtered before freezing. It may also be allowed to ferment partially to the sharp stage and then frozen. Thus, "sharp" cider can be had throughout the year.

Pineapple juice keeps well in the frozen state if flash pasteurised and cooled before freezing. If not flash heated to destroy enzymes, it may develop an off-flavour after six months' or longer storage.

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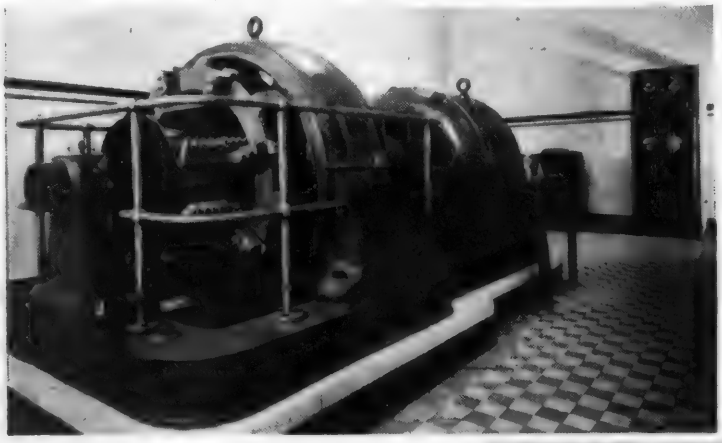
Eire's First Hydrogenation Plant

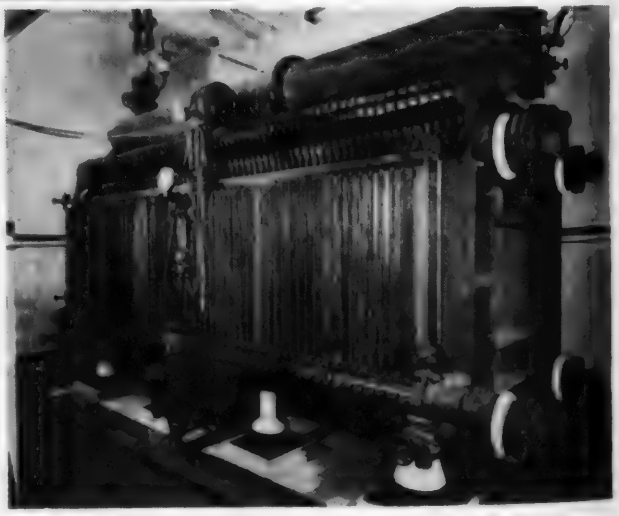
Early this summer Eire's first hydrogenation plant for oils and fats was put into operation by the Irish Oil and Cake Mills at their factory in Drogheda. The new plant is an addition to the existing oil refinery. It consists of the oil hydrogenation plant, the catalyst preparation and the hydrogen production plant.

SINCE a hydrogen purity of 99·95 per cent. is required for best grade margarine fats, a totally enclosed bi-polar electrolyser was decided upon. Electric current from the mains is converted into D.C. by a slip-ring motor-generator.

The electrolyser splits water into its elemental components at the hourly rate of 3,000 cubic feet of hydrogen and 1,500 cubic feet of oxygen. The hydrogen gas is collected in a gasholder, whence it is compressed into tanks for storage at a pressure of 400 lb./sq. in.



Below: Bamag type B.60 bipolar electrolyser producing 3,000 cu. ft. pure hydrogen and 1,500 cu. ft. oxygen per hour.



Above: The E.C.C. motor generator which converts A.C. into D.C. for the electrolyser.

Treatment of Oil

The oil to be hardened is first refined and then pumped into the hydrogenation converter, which is essentially a vertical vessel fitted with internal heating and cooling coils and an agitator driven by a vertically mounted flameproof motor. To this oil a carefully measured dose of catalyst is added. This catalyst is prepared on the spot from pure nickel formate by mixing the latter in a mill with a small amount of oil and heating it by means of steam from a circulating high temperature boiler to 180° C. to 240° C. inside a special reducing vessel. At this temperature the nickel formate undergoes a thermal decomposition according to the general equation:

$$Ni(COOH)_2.2H_2O = Ni + 2CO_2 + H_2 + 2H_2O.$$

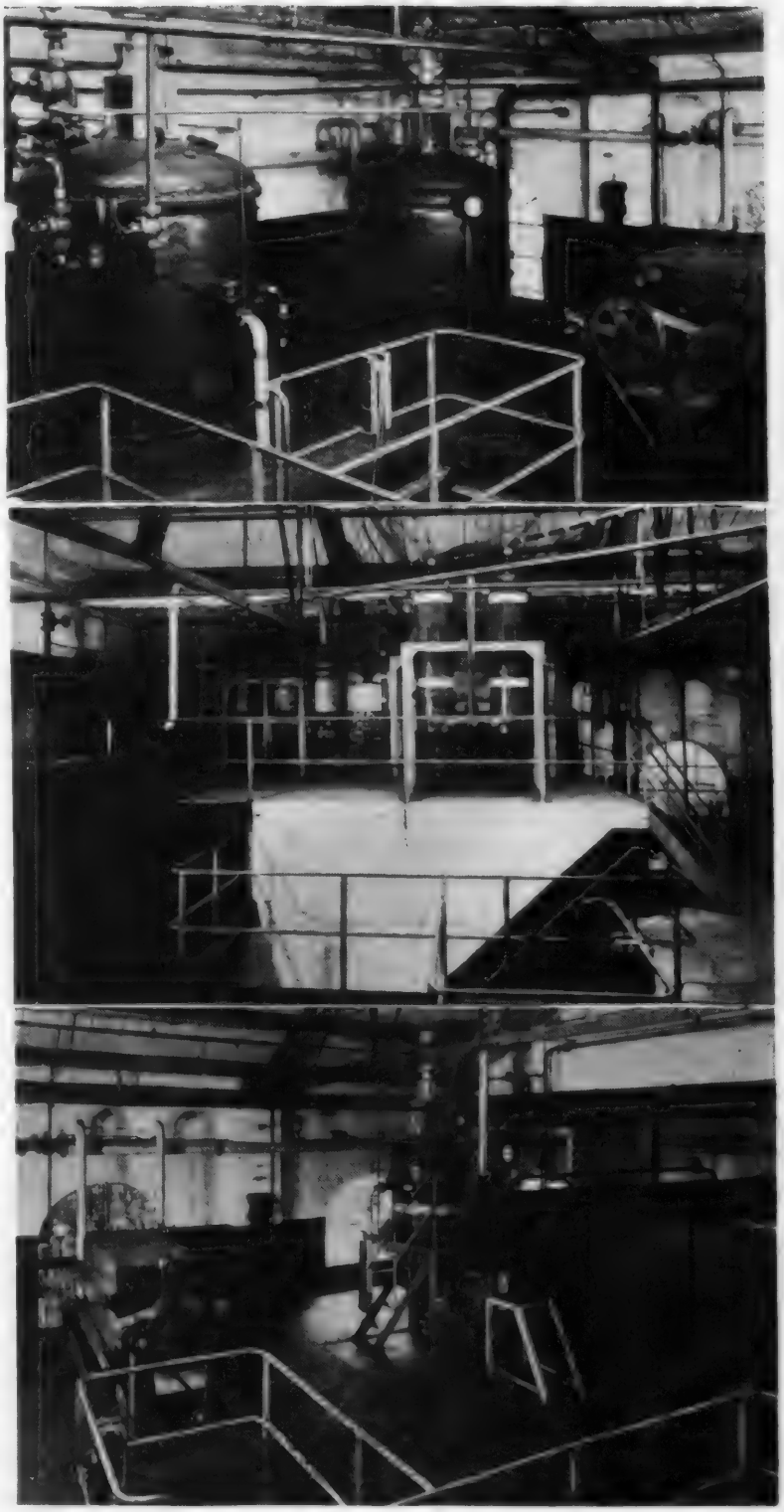
The CO_2 and water vapour are removed under vacuum and are subsequently purged with hydrogen, while the reduced nickel remains in a finely divided and highly active state in the oil. In this form it can easily be handled and measured in the special equipment provided. Once the catalyst has been added to the refined oil in the converter and the thermometer registers between 150° C. to 180° C., depending on the kind of oil, it is only necessary to open the hydrogen inlet valve to set off the reaction. The carefully dried hydrogen bubbles through the hot oil and is purged into a train of purifying towers, whence it is recirculated through the oil. This method assures a constant pure hydrogen feed, prevents accumulation of catalyst poisons, and therefore leads to a selectively hardened product and a minimum consumption of catalyst.

If the oil has reached the desired properties, which are ascer-

Left: Top part of hydrogen converter on left and soft oil-hard fat heat exchanger in centre, both fitted with flameproof vertical stirrer motors. On right, filterpress to separate the nickel catalyst from the hardened fat.

Centre: Seen on left is tank from which oil is supplied to the catalyst reducer. In centre is the hydrogen gas purification equipment, including the gas drier.

Below: Filterpress for separating the catalyst from the hardened fat, on left. The tank to take the first runs of cloudy oil is on the half-floor below the press, with the catalyst reducer. The oil storage tank is on the right.



tained periodically during operation by examining samples, the charge is cooled and filtered to remove the catalyst, which may be reused from 50 to 100 times.

Hitherto, hardened fats for margarine, biscuit and confectionery fats, and for soap had to be imported into Eire. They can now be covered by a home industry. Groundnut, soya bean, cotton seed, sesame, and other vegetable oils hardened to accurately determined melting points will be used for making high-quality edible fats. Whale oil from the Antarctic, fish oils from the Pacific and South Africa, animal fats from the Americas, and rendered products from meat factories in Eire will be hydrogenated to higher melting point fats for use in luxury soap. All these oils are first thoroughly refined in order to achieve better hydrogenation performance. During hydrogenation the oils lose their odour, their colour turns practically white, and after post-refining and deodorisation a perfectly bland fat is obtained.

SUPPLIERS OF EQUIPMENT

Motor Generator and Accessories: *Electric Construction Company Limited, Wolverhampton.*

Hydrogenation Plant: *Bamag Limited, London.*

Poisons and their Detection

How often a sample is received with a request to examine it for poisons, without further information, even when the sample is submitted by someone who ought to realise that an analyst is not a magician. Alternatively the analyst may be rung up on the telephone and be informed that the enquirer has a tablet for analysis—how long will it take to analyse and what will it cost? Sometimes the suspected poisoner has been in the East and therefore knows all about poisons which cannot possibly be obtained in this country, so that, before the analyst even commences work, he is assured by his client that no answer will be found to the problem.

Such an analyst and anyone else occupied with toxicological examinations will welcome the second edition of a helpful book* on the subject. The first edition appeared in 1940 after the untimely death of its author, Mr. Frank Bamford, formerly the director of the Medico-Legal Laboratory, Cairo, and it was seen through the press by his son, Mr. H. F. Bamford. The volume is essentially an analyst's laboratory handbook with the imprint of the expert who does not waste time describing a number of tests, which he has not found to be useful, but who gives usually about two tests for each substance mentioned, together with references to the literature where relevant.

Dr. C. P. Stewart has now revised the text, examining it carefully, leaving the bulk of the wording as written by the original author, but quietly inserting fresh paragraphs, deleting others which are no longer necessary, and generally bringing the volume into line with more recent knowledge. So well has the work been done that a superficial glance gives the impression that the book has merely been reprinted, owing to the care the reviser has taken to preserve the style of the original author, but closer examination shows that sometimes two or three lines have been omitted from a paragraph or an entirely fresh one inserted. As a result the number of words in the book is about the same as in the first edition, but, owing to the use of a slightly smaller print, the present volume contains about forty pages less than before.

There are so few books on toxicology which are really useful to the analyst that the present reviewer has no hesitation in saying that anyone who is in any way concerned with the subject ought to have a copy of this book at hand, and it is to be hoped, therefore, that one or two suggestions for improvement in a third edition may not come amiss.

While the information given in Chapter I on the classification of poisons and general procedure is very useful to the analyst, it would be an advantage if the grouping were so arranged that ante-mortem and post-mortem symptoms and signs were placed together and extended. As a general rule the analyst can at best obtain information regarding eyes, vomiting, foaming at mouth, spasms, quick or slow death, etc., as ante-mortem signs and he may not always be able, especially in the case of veterinary toxicology, to gain much information regarding post-mortem symptoms. In the reviewer's opinion, therefore, Cushny's pharmacological classification is important and useful, but requires considerable expansion for the chemist. It is a thankless task, perhaps, to attempt to draw up a useful and fairly elaborate classification, but the thanks which any author would receive would more than compensate for the time occupied. Another omission, which the reviewer would like to see rectified, is the failure to make any reference to the use of chromatography, which is most useful in certain cases, such as the separation and identification of the anthraquinone purgatives.

Dr. Stewart and the publishers are to be congratulated on the freedom from mistakes in the text.—T. McL.

* *Poisons—their Isolation and Identification.* By F. Bamford, B.Sc., revised by C. P. Stewart, M.Sc., Ph.D. Pp. 304+viii. London. Price 21s.

Packaging Methods and Equipment

In recent years there have been great technical developments in packaging and a new conception of its functions, especially as regards fitting the package to the product. There are few subjects which have to be considered from a greater number of different standpoints: the hazards of transport, including rough handling, temperature and humidity variation, pilferage, and so forth; influence on mass production; appearance; the consumers' angle, including convenience of size and shape, ease of opening and dispensing; the retailers' angle; substitution due to non-availability of materials or machinery, and several others.

A report,* recently issued, examines the various methods and types of machine available under the main headings of Shipping Containers, Liquid Packages, Solid Packages, Finishing and Handling Equipment, and Special Forms of Packaging. It will assist those responsible for selection of packaging methods and installation of packaging machinery.

No means of enclosing materials into containers has been omitted, whether they be solid, semi-solid, liquid or semi-liquid; and every type of container is discussed.

An appendix gives the names and addresses of packaging materials and equipment and covers these industries to a large extent. Some useful hints on lay-out are contained in another appendix.

* *Packaging Methods and Equipment.* By O. W. Roskill and Co. (Reports), Ltd. Mimeographed. London. Pp. 57+xiv. Price 30s. net.

Odour and Oxidisability

R. W. MONCRIEFF, B.Sc., F.R.I.C.

Various means of eliminating unwanted odours have long been known. One of these commonly known methods has been oxidation; thus Earp,[1] in a discussion of the removal of unwanted odour, pointed out five general methods of which two involved oxidation. Either the putrescible components of a material could be removed by oxidation, or alternatively the offensive volatile constituents should be oxidised.

FROM the chemical standpoint it is easy to see why oxidation destroys odour. The ultimate reaction products of the oxidation of organic matter are carbon dioxide and water, both of which are odourless. Any hydrocarbon such as nonane, which has a strong odour of petrol, or diphenylmethane, which in dilution is redolent of geraniums, or limonene with its agreeable lemon-like odour, any one or all of these strong odorants can readily be oxidised to odourless carbon dioxide and water. The same consideration applies even more readily to the whole gamut of odorants, alcohols, esters, aldehydes, ketones, etc., for among these are to be found the most powerful odorants we know, but on ultimate oxidation all odour is lost. It is true that either fairly severe conditions of oxidation, or alternatively the presence of a catalyst, will be necessary to burn such products as esters and ketones to carbon dioxide and water, but it is equally true that only mild conditions are necessary to oxidise some powerfully odoriferous compounds to other compounds which are relatively inodorous.

The Aldehyde Group

As an example we may consider the aldehydes, perhaps the richest of all chemical groups in odorants, and yet so very sensitive to oxidation, so sensitive in fact that they normally deteriorate on exposure to the atmosphere, and frequently the aldehyde group has to be protected by acetal formation in order to give any reasonable degree of stability to the odorant. When the powerfully osmophoric aldehydes are oxidised they are converted first to acids, which as a group are only weak osmophores. In fact most of the "odour" of volatile acids is chemical irritation; the sensory receptors which are affected by acids are mainly those of the trigeminal nerve responsible for the common chemical sense, while the olfactory nerve and receptor cells, which are responsible for true olfaction, are excited only to a less degree. Alcohols, too, are usually converted by oxidation to acids, because the conditions which will lead to the formation of aldehydes and ketones from alcohols are quite special ones and unlikely to exist in ordinary circumstances. As an example of this we may recall that Austerweil and Cochin,[2] in their classic researches on the relation between chemical constitution and the rose odour, found that in the case of all the citronellol derivatives which they examined, the odour was lost on oxidation of the alcohol group.

It is well known that methods generally adopted for the purification of water consist of treatment with chlorine or ozone, both of which are powerful oxidising agents. Unless some such treatment is adopted, algae, which give rise to odours varying in type from pig-stye to mushrooms, flourish in reservoirs.

Another example of oxidation being used to destroy odour is to be found in German Patent 614,352,[3] which describes a method of removing metallic taint caused by such foods as onions, leeks, and mustard from cutlery. An oxidising agent that does not attack the metals, but which will attack the odorous bodies on them, is used such as hydrogen peroxide or neutral aqueous solutions of perborates. Odour is due to the presence of oxidisable bodies; if, therefore, these bodies are oxidised, then they are no longer oxidisable and no longer odorous.

Niccolini's Theory of Oxidisability

So readily are the majority of odorants oxidised that oxidisability formed the corner-stone of Niccolini's theory of odours.[4] In this theory it was postulated that there were three pre-requisites for a substance to be odorous, and these were volatility, solubility in the nasal mucosa, and oxidisability. The first two of these are factors common to many theories of odour, but it was quite a new departure to suggest that to be odorous a substance must be oxidisable. Niccolini examined seventy-five different substances and found that out of eighteen which were oxidisable in one minute, sixteen (88 per cent.) were odorous, while out of fifty-seven which required much longer to oxidise only twenty (35 per cent.) were odorous.

Clearly, those substances which are most readily oxidised are also most odorous. It is only necessary to think of the hydrocarbons. The acetylenes and olefines, which are readily oxidisable at their

points of unsaturation, are also strongly odorous compared with their saturated analogues the paraffins. It has time and again been noticed that unsaturation is usually accompanied by strong osmophoric properties, and, as it is the case that most unsaturated compounds are readily oxidised at their point of unsaturation, it might be argued that it is not unsaturation which is the prime cause of odour, but rather that it is oxidisability, and the fact that most unsaturated compounds are odorous is simply a special case of the general law that oxidisable compounds are odorous. In this connexion it is interesting to note that Angeli and Polverini[5] pointed out that among the substituted coumarins only those have odour which are readily oxidised, and at the same time they speculated as to whether this was a clue to the mechanism of olfaction.

Oxidisability and Food Flavour

It is well known that odour is the major component of the complex sensation which we describe as flavour. Apart from the contribution of the four simple tastes—sweet, bitter, sour, and salty—flavour is entirely odour. If only oxidisable substances are odorous, it might be thought that the presence of an oxidation inhibitor otherwise known as an antioxidant would prevent the formation of undesirable odours in food.

The use of antioxidants in edible fats was investigated by Lea.[6] The various oxidation inhibitors were tested at two temperatures, 37° C. and 100° C. The test at 100° C. was a chemical method consisting of estimation of peroxide to provide a rapid "sorting test," while that at 37° C. was a confirmatory test in which the taste and colour of the fat were employed as additional criteria of condition. Tests at 100° C. were carried out with both butterfat and with rendered beef fat; the fat was shaken with a known volume of air and the absorption of oxygen noted by manometric measurement and also by determination of peroxide value. As the two methods gave concordant results it was felt that they were reliable. It was found that at a certain point there was a rapid bleach of the carotenoid pigment and the development of a tallowy odour. A great many substances were tried as antioxidants, and the most powerful were pyrogallol, quinol, 1·5 dihydroxynaphthalene, the condensation product of pyrogallol with acetone, gallic acid and its esters, pyrocatechol, and haematoxylin, while those of moderate effectiveness included proline, protocatechuic, tannic acid, guaiacum resin, and natural mixed tocopherols. Gallic acid and its esters were about equal in activity on a molecular basis, and ethyl gallate was the most satisfactory agent to give protection against oxidation without discolouring or imparting a foreign flavour to the fat. As little as 0·005 per cent. ethyl gallate in butterfat retarded the development of tallowiness and the loss of carotenoid pigmentation. In the case of lard 0·01 per cent. ethyl gallate was effective at 37° C. in inhibiting oxidation, and in the case of refined and deodorised cotton-seed, peanut, and palm oils the same quantity of ethyl gallate had some inhibiting effect at 25° C. The potency of the ethyl gallate as a protective agent was greater at the lower temperatures; it gave more protection at 25° C. than at 37° C. and more at 37° C. than at 100° C. Ethyl gallate was effective in the presence of traces in iron, which might be an important point in the case of canned goods which had been opened, but its efficiency was diminished by the action of light. It is clear, however, that these powerful antioxidants greatly reduced the development of unpleasant food odours.

Oxidisability as a Measure of Food Deterioration

A substance which can readily be oxidised is itself a reducing substance. A method of determining the volatile reducing substances in the pressed out juices of flesh foods has been described by Lang, Farber, Beck, and Yerman.[7] The juice is extracted from a ground sample under a pressure of from 2 to 5 tons. Five millilitres of the juice is aerated with 2 cubic feet of clean air, and this air, which after being drawn through the test sample now contains the volatile material, is aspirated through two reaction vessels containing decinormal potassium permanganate in normal caustic soda. The reduction that takes place of the potassium permanganate is taken as a measure of the volatile reducing substances present. Values are given for unprocessed and canned sardines, mackerel, and tuna at various stages of spoilage. The method could be applied to the evaluation of odorous principles in foods where palatability and desirability are dependent on the concentration of volatile substances. In another series of experiments ground beef steak was incubated for fifty hours at 37·5° C. Tests taken over the fifty hours showed a gradual increase in the volatile reducing substances in the *p*H value and in the tainted odour.

The Stinkometer

An instrument with this rather unattractive name was developed from the work just described. Lang, Farber, and Yerman[8] adapted the method of absorption in alkaline permanganate to measure changes in the content of volatile reducing substances. It was possible by measuring the reducing volatile matter in foodstuffs to detect incipient spoilage before there was any change perceptible to the sense of smell. The instrument was used to measure odours in fish, fish products, meats, and raisins, and to detect loss of aroma in foodstuffs such as coffee, spices, and pepper, which normally possess attractive odours. Loss in strength of perfumes could also be assessed by the same instrument.

Can Oxidation be Eliminated?

Tests made by McGugin[9] have shown that if certain enzymes can be inactivated, oxidation may be prevented even on exposure to air of such foods as potatoes and apples. But in order to destroy the oxidase by the inactivator it is first necessary to crush or pulp the fruit or vegetable. In view of this requirement it is unlikely that such a process would meet with wide approval. It has been suggested, too,[10] that enzyme-catalyst oxidation changes may be prevented or retarded by the addition of ascorbic acid in the case of frozen peaches and apricots.

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[9] F. W. McGugin, *Quick Frozen Foods*, 1946, **9**, 80-81.
[10] Hoffman-Laroche Inc., *Food Packer*, 1945, **26**, No. 12, 38-40.

Recipes and Processes

A COMPREHENSIVE volume* recently published covers recipes and processes for the manufacture of commodities used in the industries, arts, and professions. There are forty sections dealing with different subjects.

These are animal foods, veterinary remedies, fertilisers, foodstuffs, beverages, flavourings, cosmetics, disinfectants, soaps, starches, laundry blues, polishing soaps, fats and oils, oils and greases, paints, varnishes, stains, cellulose lacquers, distempers, driers, enamels, gold sizes, boiler compositions, boiler and other cements, blackleads, metal cleansers and polishes, stove polishes, polishes, powders, and cleansing compounds, boot and leather preparations, harness and leather dressings, furniture and leather polishes, candles and candlemakers' products, stationers' and office supplies, inks, printing and lithographic, lutes, pyrotechnics, explosives, analysis of textiles, miscellaneous, oil, paint, and varnish driers.

This book should have an interest for a large circle of readers, professional and amateur. The carrying out of the processes is described in a clear manner, and the recipes have every appearance of authenticity.

The six editorial consultants and the general editor, Dr. G. S. Ranshaw, may be congratulated on the arrangements and production of the book, including the reliable index.

* *Manufacturers' Practical Recipes*. Pp. 424. London. Price £2 16s. 9d.

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, Aug. 1, 1948, page 364.

No.	*Date.* 1948.	
		PRICE FIXATION ORDERS
1508	June 30.	Order amending the Fish (Control and Maximum Prices) Order, 1947.
1509	„ 30.	The Meat Products and Canned Meat (Control and Maximum Prices) Order, 1948. Revokes S.R. & O. 1947, Nos. 162, 545, 1105.
		FEEDINGSTUFFS
1099	May 26.	The Feedingstuffs (Regulation of Manufacture) Order, 1948. Revokes S.R. & O. 1947, Nos. 1263, 2816.
1205	June 7.	Order amending the Feedingstuffs (National Priority Pigeon Mixture) Order, 1943. Revokes S.R. & O. 1943, No. 982; 1946, No. 1610.
		FOOD STANDARDS
1073	May 24.	Order amending the Food Standards (Mustard) (No. 2) Order, 1944. Revokes S.R. & O. 1947, No. 650.
		MEAT
1119	May 25.	Order amending the Public Health (Meat) Regulations, 1924.
		MILK
1117	May 25.	Order amending the Milk (Special Designations) Order, 1936.
1122	„ 25.	Order amending the Public Health (Condensed Milk) Regulations, 1923.
1123	„ 25.	Order amending the Public Health (Dried Milk) Regulations, 1923.
1163	June 1.	The Milk (Non-Priority Allowance) (No. 3) Order, 1948.
		POINTS RATIONING
846	Apr. 26.	Order amending the Food (Points Rationing) Order, 1947.
1055	May 23.	Order amending the Food (Points Rationing) Order, 1947.
		POTATOES
948	May 5.	Order amending the Potatoes (1947 Crop) (No. 2) Order, 1947.
1116	„ 27.	The New Potatoes (1948 Crop) Order, 1948.
1130	„ 28.	Order amending the Potatoes (General Provisions) Order, 1944. Revokes S.R. & O. 1947, No. 2440.
		TOMATOES
1510	June 30.	Order revoking the Tomatoes Order, 1948.

Letters to the Editor

Vegetable Lecithin

DEAR SIR,—May I, through the medium of your columns, be permitted to pass a few comments on the article on vegetable lecithin which appeared in the July issue of FOOD MANUFACTURE? There are a number of remarks both in the preamble and in the text of the article which suggest that the origin of most of the lecithin available on the English market today is the soya bean. Such is not the case. While a little soya bean lecithin is from time to time available, by far the greater part of the lecithin available to English manufacturers during the last seven years has been derived from the groundnut.

The history of the manufacture of vegetable lecithin may interest some of your readers. Prior to 1939 most of Great Britain's requirements of lecithin were supplied by Hansa Muehle A.G. of Hamburg, the company which was responsible for most of the early pioneer work on the manufacture of vegetable lecithin. When supplies from Germany were cut off, imports were for a short time permitted from the U.S.A. Dr. Bruno Rewald, who had left Germany after the Nazis came to power, had meantime been working in England, and had found that lecithin could be manufactured from other oil-bearing seeds, notably groundnuts and cottonseed. On his advice a plant was started in 1940 for the production of lecithin from groundnut oil, and with one interruption has been running ever since. Groundnut lecithin differs from soya lecithin in its fatty acid constitution and its colour and flavour, but it has been found by prolonged use in many industries that its fundamental surface-active and antioxidant properties are the same. Though there is comparatively little published information about groundnut lecithin, nevertheless it is certain that it has come to stay, particularly as the country's economy will in future rely more and more on the groundnut as a source of edible fats.

Yours faithfully,

C. LESLIE BIBBY.

J. Bibby and Sons, Ltd.,
Liverpool.

The Estimation of Pectin

DEAR SIR,—In Mr. C. L. Hinton's letter, published in your August issue, he mentions that the principle of H. Deuel's method for the estimation of pectin is very similar to the one applied by him.

He points out that the difference between the two methods is that his takes account of all the carboxyl groups, while the other method takes account only of the carboxyl groups of the pectin which are free or esterified, while it ignores the carboxyl groups engaged in salt formation.

We admit the difference, but would like to say that we did not want to assimilate the two methods, but only to mention the name of Mr. Hinton to illustrate the fact that several authors used a volumetric method for pectin determination in opposition to the calcium pectate gravimetric method.

Moreover, Mr. Hinton affirms that in the calcium pectate method the results must be decreased by 2 per cent. and not 8 per cent.

In order to justify the factor we used, we mentioned the work of H. Lüers and K. Lockmüller, *Die Messungder Gelierkraft von Fruchtpektinen*, where the authors return to the method of H. Carré and D. Haynes, who were the first to establish the per cent. calcium introduction in the molecule of pectin. Their conclusion was: *Von dem gewicht sind 8 per cent. für Kalzium in Abzug zu bringen.*

We used this correction, and the concordance of our experimental results confirms this factor (see Table II of our article).

We agree with Mr. Hinton's remarks concerning the applicability of the volumetric method for estimating pectin in jams.

We should like to point out, however, that the purpose of our work was the study of a method for estimating pectin in a pure product; occasionally we tried to ascertain if the volumetric method could be applied with advantage for jams.

It is, of course, possible to apply this method for jams, but we do not recommend it because of the numerous and long manipulations it necessitates. In ordinary control work, what interests us is a rapid method, giving as few errors as possible.

The volumetric method, as Mr. Hinton points out, necessitates an extraction with water, a filtration, the evaporation of a considerable amount of water, and a separation of the pectin by precipitation with acetone or alcohol. A method involving all these operations, preceding the determination of the pectin, has no advantages over the gravimetric method, which is more rapid because it is directly done on a solution of the jam. It thus avoids the errors which always accompany too prolonged an operation.

It is for these reasons that we did not recommend the volumetric method, but preferred the gravimetric method for the estimation of pectin in jams.

Yours faithfully

(for the Chief of the Laboratory),

S. VAN DEN DRIESSCHE, DR.SC.CHIM., A.C.BR.

Laboratoire Central, Ministère du Ravitaillement et des Importations.

Brussels.

BOOKS RECEIVED

Bergey's Manual of Determinative Bacteriology. Edited by Robert S. Breed, E. G. D. Murray, and A. Parker Hitchens. Sixth Edition. Pp. 1529+xvi. London. Price 82s. 6d. net.

Advances in Food Research. Vol. I. Edited by E. M. Mrak and George F. Stewart. Pp. 459+xv. New York. Price 41s. 6d.

The S.C.I. in Edinburgh

Acclaimed to be one of the most notable in its sixty-seven-year-old history, the Edinburgh meeting of the Society of Chemical Industry consisted of a full week of scientific sessions, social events, and factory visits.

THE organisation of the first full-dress meeting of the Society since the war was carried out by the Edinburgh and East of Scotland Section under the chairmanship of Dr. W. M. Ames, and full credit for the outstanding success of the meeting was accorded to the Section by members and their guests—some 500 strong.

Sir David Rivett, K.C.M.G., F.R.S.

New President

The election of the new President was the chief business of the annual general meeting held on July 13 in the Assembly Rooms, George Street —the headquarters of the Society throughout the week. After being welcomed by Bailie Tom Scott, deputising for the Lord Provost, and by Professor Sidney Smith, acting Principal of Edinburgh University, the meeting approved the Council's nomination of Sir David Rivett. Sir David, who is chairman of the Commonwealth Council of Scientific and Industrial Research, was not present, but a message from him thanking the Society for the honour was read by the Secretary.

During the election of officers which followed, the present holders of the chief appointments were re-elected, and Dr. L. H. Lampitt, following his retirement after two memorable years of office, was elected a Vice-President.

Planning Criticised

Criticism of the " many leftish intellectuals in the ranks of scientists today who would plan everything for us," was voiced by Dr. Lampitt in his speech as retiring President. The title of his address was " A Brave New World," during which he distinguished between " research " and " investigation." Research was more fundamental and refused to be planned in the sense of the modern use of that term; investigation was concerned with the application to practical problems of the result of research. The incentive for research and its reward was the satisfaction which came from the expression of the desire to explore the unknown. " No scientist worthy of the name could subscribe to Mr. Morrison's idea that all research work must be judged by its utilisation value." With this contention Dr. Lampitt underlined his criticism of those obsessed with planning. " They forget that they cannot plan brains or inspiration. . . . They plan for planning's sake and not for the good of the community. They have a high mental volatility and a low intellectual flashpoint."

Dr. Lampitt concluded by deploring the tendency towards State-minded research since he feared that the work of the scientist would become bogged down with bureaucratic control. He regretted that the amateur in science was dying out. By amateur he meant the man who pursued science for the love of it, and because he could not help himself.

Research and the State

Sir John Anderson presented the other side of the picture. In the course of his Messel Medallist address entitled " Science in Relation to the Public Services," Sir John said that Great Britain was and still is the pioneer in the organisation of scientific research and claimed that a system of great intrinsic strength and flexibility had been built up.

The deplorable state of the chemical industry at the beginning of the 1914-1918 war was given by Sir John as the reason for the entry of the Government into the organisation and stimulation of scientific research. To make up for the neglect of the past the Department of Scientific and Industrial Research was established in 1916. A Medical Research Committee which blossomed into the Medical Research Council had already been set up. The establishment of the Agricultural Research Council followed, and this marked the completion of the first stage in the development of scientific organisation by the State.

The second stage was the establishment at the beginning of the Second World War of research units by individual departments such as the Ministry of Food, the Office of Works, Supply Departments, etc. There was, however, still no central co-ordination. Eventually this was provided by the establishment of a Central Advisory Committee under the direct control of the Lord President of the Council. This has now become the Advisory Committee on Scientific Policy.

Sir John Anderson receives the Mossel Medal from Dr. L. H. Lampitt.

Thus the third and final stage in the organisation of Government research was completed.

The setting up of machinery to enable the results of research to be readily available to those who had put them into practice was Sir John's next point, and he mentioned the establishment of the National Research and Development Corporation as an example.

Finally, he reiterated his conviction that the administrative staffs of the Civil Service should have a better understanding of scientific matters and argued that recruits to the higher branches should be men with scientific training.

Chemistry and Medicine

The dependence of medicine upon chemistry was mentioned by Sir Charles Harington in his speech as chief guest at the annual dinner. The fact that he, a chemist, was director of the National Institute for Medical Research was, he suggested, proof enough of the role played by chemistry in fighting disease. Sir Charles developed his theme by citing examples of the chemist's achievements in medical science.

Future Plans and Handicaps

Speaking of the past and future of the S.C.I., in response to Sir Charles's toast to the Society, Dr. Lampitt said that at present plans were frustrated but that they were being kept alive. Perhaps the greatest handicap was the lack of paper. He though it quite wrong that bookstalls should be littered with "pseudo-pornographic literature," while learned societies clamoured in vain for paper to print the results of important scientific research.

The Lister Lecture

One of the outstanding scientific sessions of the week was the Second Lister Memorial Lecture given by the President of the Royal Society, Sir Robert Robinson, on "The Device of Imitation of Molecules in the Biological Field." For ninety minutes he treated his audience to a masterly exposition of his and other chemists' work on the preparation of analogues of alkaloids, hormones, and other drugs by molecular rearrangement.

Ten other lectures delivered during the meeting, most of them given by Scotsmen, dealt with Scottish developments, thus linking up with the picture of Scottish industry afforded by visits to eight works, covering various manufacturing activities. The four lectures of interest to food chemists and executives were "Chemistry and Agriculture," by Professor Stephen J. Watson, Principal of the Edinburgh and East of Scotland College of Agriculture; "The Spoilage of Fresh Fish and its Control," by Dr. G. A. Reay, Director of the Torry Research Station, Aberdeen; "Refining and Hardening of Vegetable Oils," by Alexander Arneil of Western Margarine Ltd.; and "Two Problems in Brewing Science," by Dr. I. A. Preece.

Dr. Reay stressed the necessity for a fuller exploitation of marine fisheries which would contribute to the expansion of home-produced food. He reviewed existing knowledge of spoilage, methods of evaluating quality, and the limitations of preservation by chilling. With regard to the grading of fish for quality, he referred to recent investigations which suggested that estimation of the amines might possibly afford a basis for satisfactory objective tests which would usefully supplement organoleptic judgment.

The Social Side

The social side was varied and interesting. Dinners, dances and outings of all kinds catered for the tastes of members and their guests of both sexes, young and old.

Sir Robert Robinson gives the Lister Memorial Lecture.

Lubrication of Bakery Travelling Oven Chains

E. V. PATERSON, A.M.I.Mech.E., M.Inst.Pet.

The lubrication of oven chains has been a problem to oven designers and chain makers for many years. Oven temperatures are frequently much higher than any mineral lubricating oil will stand yet the chains must not wear out or lose their flexibility. Graphite is the only succesful lubricant but it must be correctly applied so as to coat the chain pins and other bearing surfaces. Methods of application described in this article have resulted in a considerable extension of chain life.

THE endless chains employed for bakery ovens are of several types, but in all cases they are costly to replace. Under ideal conditions they should last approximately the life of the oven, but they do not always do so in practice. In present times their renewal is almost impossible, and chain makers often refuse to supply except in case of breakdown. Lubrication of these chains is essential for the efficient working of the oven quite apart from the saving that can be made in maintenance costs.

Sections of some typical chains used for travelling ovens are shown in Figs. 1, 2, and 3, and it is seen that lubrication is required for the bushes and pins and to maintain the flexibility of the links. If the chains are not always perfectly flexible, "dog-legging" of the connecting links will occur.

In many cases oven makers provide no mechanical system of lubrication, and oiling of these chains must be done by hand, *i.e.* by means of an oil-can or by brushing the lubricant into the link joints. These are poor methods, for not only do they waste considerable man hours but the work cannot be perfectly done. The average type of travelling bread oven, for example, having two chains, and taking anything from half to one hour for the chains to make one complete revolution, will occupy this amount of an oiler's time from three to six times a week. The cost of this in labour alone is about £40 per annum per oven, and in spite of this cost it is extremely difficult to ensure that every link of the chain is correctly lubricated. Ovens having more than two chains require two complete circuits to effect lubrication by hand, since the oiler cannot deal with three or more chains at once and ensure lubrication of every joint.

Oven temperatures may range from 250° F. to 650° F. for various normal bakery requisites, and at least one firm manufacturing dog biscuits employs a temperature in excess of 750° F. The flash point of a medium machine oil will only be about 400° F., and that of a high grade, viscous, steam cylinder oil will not greatly exceed 600° F.

Lubrication by Oil

The first attempts to lubricate chains running in elevated temperatures were made many years ago. The ovens concerned were principally drying ovens used in various types of industry and the temperatures did not exceed the flash point of good quality straight mineral lubricating oil. When oven temperatures began to rise above 350° F. and occasionally over 400° F., as they did immediately travelling ovens were used for baking, these oils began to form carbon which interfered with the free movement of the links and rollers and caused breakdowns. It then became the practice to employ a steam cylinder oil. This was preferably a filtered one having a flash point of over 600° F.

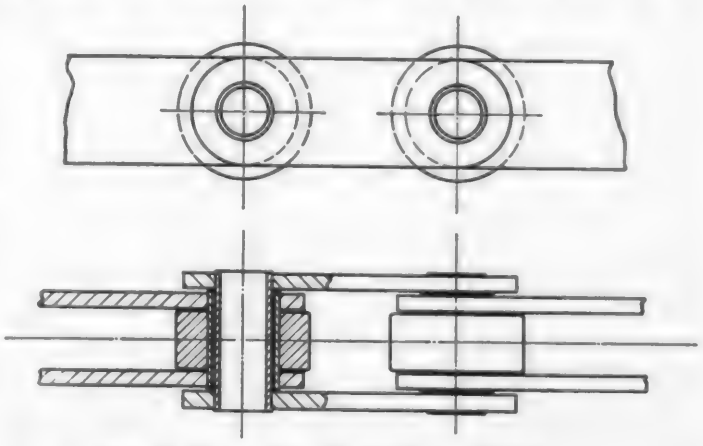

Fig. 1.—Hollow bushed type link; two bushes are employed.

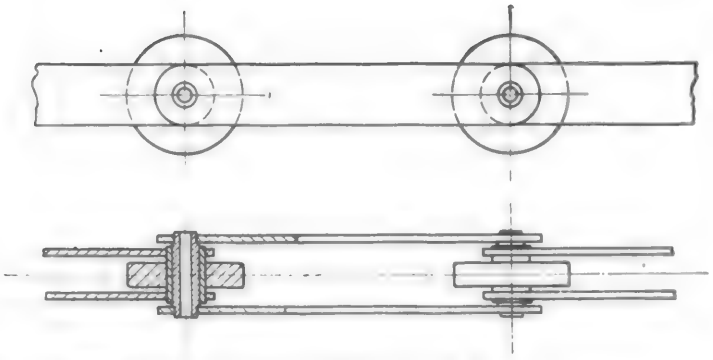

Fig. 2.—Hollow bushed type link of differing pitch from Fig. 1.

Providing the oven temperature did not exceed 450° F. such lubricants worked reasonably satisfactorily, but tended to form carbonaceous deposits when exposed to high temperatures for considerable lengths of time, and as a result the chains were never really clean. When baking takes place every day, the oven never really cools off and the oil on the chains is therefore always subjected to high temperatures. Occasionally the rollers became gummed up, ceased to rotate, and links lost their flexibility, with the result that the chains refused to travel round the sprocket wheels and breakages occurred, resulting in the wastage of the whole contents of the oven. Steam cylinder oils had to be very sparingly applied, so that it was at this time that attempts were made to employ mechanical lubricators. Carbonisation of the oil occurred and the chains became very dirty. Trouble particularly occurred when oil was overfed to the chains.

First Uses of Graphite

The best lubricant for high temperatures is graphite. The first efforts were to mix flake graphite into the steam cylinder oil, but it was not at first realised that this did not raise the temperature at which the steam cylinder oil formed carbon, and unless these carbon deposits were eliminated no advantage could be gained. It is true that the graphite remained on the job and effected a certain degree of lubrication after all the oil had burned away, but the trouble with carbon deposits outweighed any advantages and the net improvement in lubrication and flexibility of the chains was nil.

An effort was made to discover some method of getting the graphite to the roller pins and between the links without using an oil that would carbonise, and first steps in this direction were to use flake graphite itself. The chain rollers were provided with holes running diametrically and these were filled with flake graphite, which therefore lubricated the rollers as they turned on their pins. This did not keep the links free, since the graphite would not travel along the pins and only lubricated those surfaces that actually came into contact with it. This was no method of ensuring flexibility of the links.

The next improvement was to use a graphited paste and apply to the chains by mixing with a little water and brushing on by hand. In this way the water acted as a carrier for the graphite to the bearing surfaces and then evaporated away in the heat of the oven, leaving the film of graphite on the surfaces required. The trouble with this method was that the chains needed to be cold, or nearly so, before application of the graphite paste, otherwise the water evaporated away before it had time to carry the graphite down to the bearing surfaces. Chains lubricated in this way were sometimes found to have become rusty, due to the fact that the lubricant had been applied when the chains were at a temperature lower than that required to vaporise the water, and during the long spell before the oven was used again the water had caused rusting, accelerated by the further condensation of water in the warm oven. Several of these pastes have been marketed, and some of them employ a better carrier for the graphite than water, one that will evaporate off at a reasonably high temperature and leave behind little or no deposit. Some chains are in use today with good results after many years of this type of lubrication, but the disadvantages are that application can only be by hand and not to a hot chain.

Use of Colloidal Graphite

One of the best methods is to use colloidal graphite suspended in oil. The oil is specially prepared so that it will vaporise off in the oven tem-

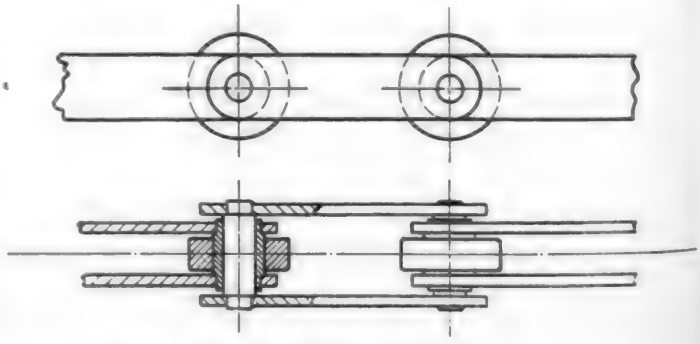

Fig. 3.—Solid pin type link with single bush.

perature, and in doing so will leave the minimum amount of deposit. The infinitely small amount of deposit left behind will act as a binder for the graphite. The oil must not vaporise before it has been able to take the graphite down to the pins, and the viscosity of the oil must be carefully chosen to suit both the type of chain in use and the oven temperatures. In the case of a small pitch chain, having only small clearances through which the oil must quickly percolate to reach the inner bushes, a thin oil is required, but where the clearances are large and the oil must not run straight off the chain before it has a chance to deposit the graphite, a more viscous oil must be used. In all cases the oil must be one found by lengthy experiment to be most suitable for the work.

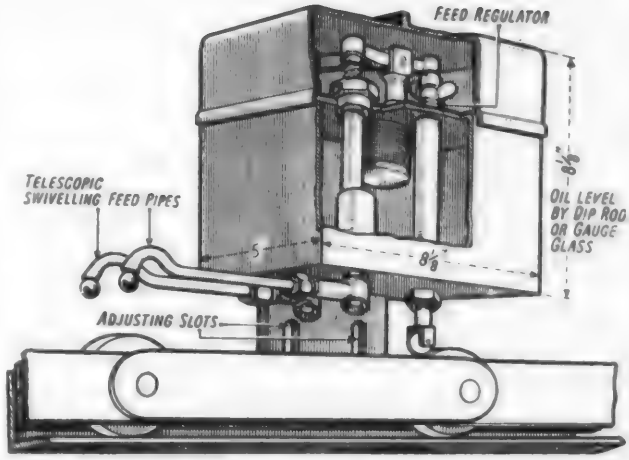

Fig. 4.—Old type of mechanical chain lubricator.

It will be noted that with a graphited oil of this type the oil has little to do with the actual lubrication of the chains, but only acts as a carrier for the graphite. Having deposited this on the bearing surfaces its work is done and it can vanish, providing it leaves no detrimental deposits behind it. Graphite is the best possible lubricant for chains, perfect lubrication being ensured by the graphited film that coats the bearing surfaces. It is only necessary to feed a small amount in order to make up any breaks in the film that may have rubbed off. In addition, a film of graphite will protect the surfaces against corrosion from atmospheric conditions.

Prover Chains

In some of the older types of bread ovens the same chains were common to both oven and prover. When ungraphited mineral oils were used for chain lubrication and the oven operator used large quantities of steam in the prover, it frequently occurred that the steam washed the oil film from the chain and no lubrication was possible. When a film of graphite forms over the bearing surfaces of pins and joints wet steam will not wash this away.

Most provers employ a certain quantity of wet steam and some use considerable quantities that vary according to the theories of the baker. Wet steam will most certainly remove lubricating oil from the chains unless this oil has been suitably compounded with a "fixed" or fatty oil. The temperature in provers is relatively low and lubrication by oil is always possible. Graphite is a good lubricant for chains, however, and the ideal prover chain oil is a graphited one that has been compounded with a fixed oil. In these cases, as distinct from oven chains, the oil itself can act as a lubricant and the graphite is added.

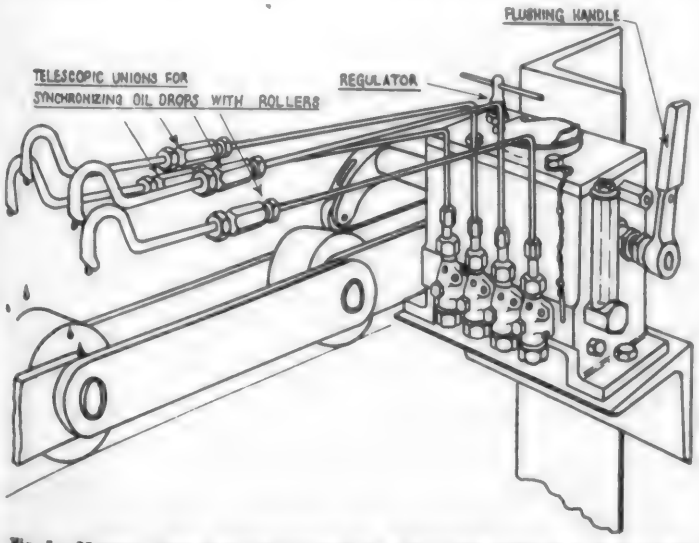

Fig. 5.—Modern type of mechanical chain lubricator with four feeds to the same chain, which has a double bushed type of joint.

With the latest chain lubricants, chains can be successfully lubricated at temperatures of over 750° F. providing a relatively cool portion of the chain can be employed for feeding the oil. If the oil is directly applied to the chain when at this high temperature it may vaporise off too quickly, leaving the graphite on the outer surfaces where it is not required. In cases of ovens operating at temperatures in excess of 750° F. and no cool run of chain can be found, it may be better to lubricate them thoroughly at a weekend or when the chains have cooled down. Usually, however, a run of

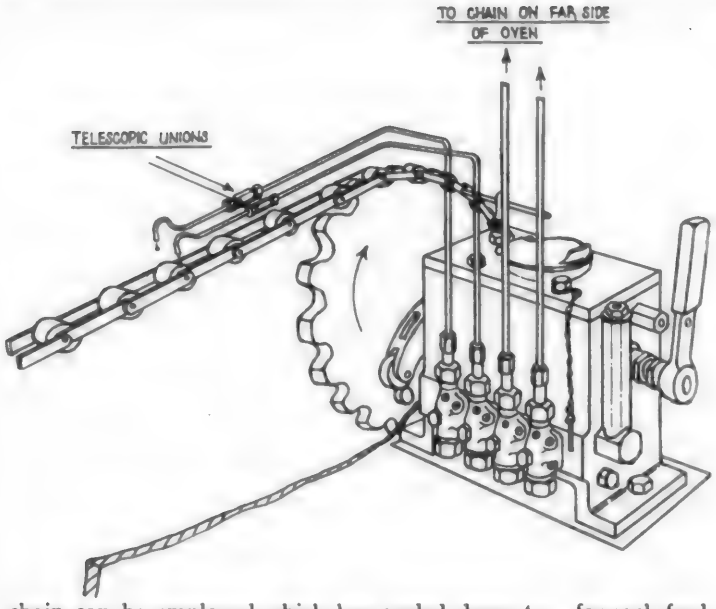

Fig. 6.—Mechanical lubricator fitted to a biscuit oven.

chain can be employed which has cooled down to below the maximum oven temperature.

Mechanical Lubricators

Two complementary factors are imperative to provide satisfactory oven chain lubrication:

1. Correct grade of graphited oil.
2. Correct method of application.

The modern chain lubricants can be applied to chains by means of a brush, oilcan, or mechanical lubricator. Possibly, of these two methods the latter is preferable if done conscientiously. The advantages of fitting mechanical lubrication can be summarised as follows:

1. Saving of man hours (about one hour per day per average size two-chain oven).
2. Lubrication is accurately synchronised so that every link receives its quota.
3. Systems are foolproof. Lubricators commence to work when the chains commence to move, and stop when the chains stop.
4. Oil is only applied to the exact positions required. This is not possible when lubricating by hand.

The first type of mechanical lubricator was of the two feed type employing separate pump units for each feed. A chain lubricator must always have separate pumping units for every feed, and split feeds are to be avoided at all costs. Oil will always take the line of least resistance, and if one side of a split feed were to become only partially choked all the oil would go to the other side. Early types of mechanical lubricator employed for this work are shown in Fig. 4. These were fitted over the

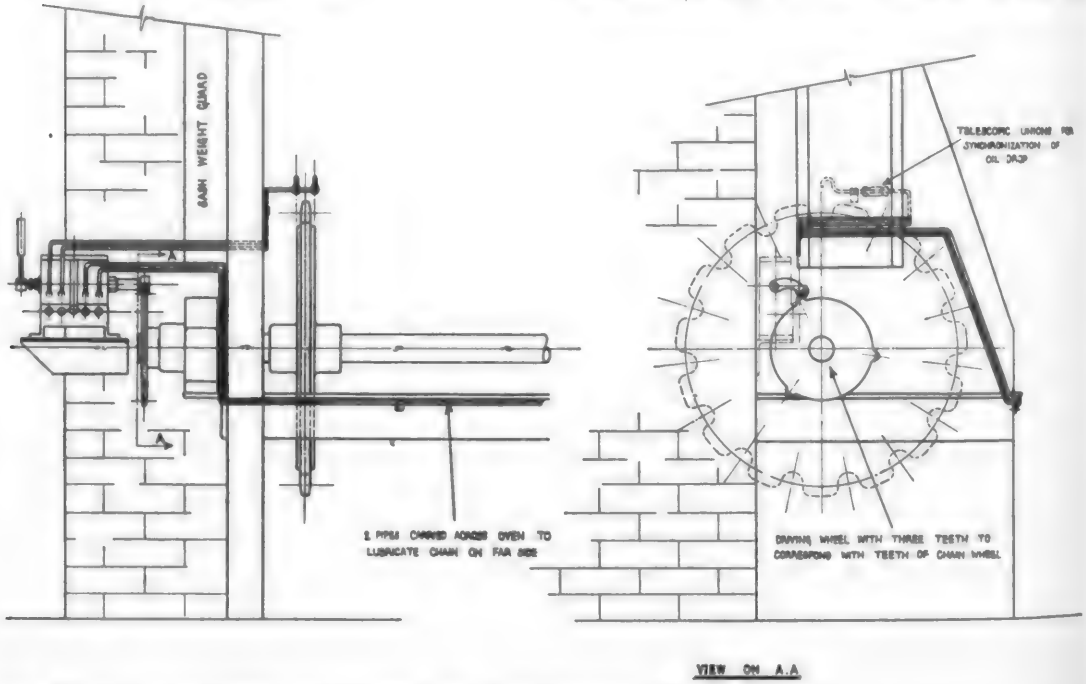
BASH WEIGHT GUARD
A
A
2 PIPES CARRIED ACROSS OVEN TO LUBRICATE CHAIN ON FAR SIDE
TELESCOPIC UNIONS FOR SYNCHRONIZATION OF OIL DRIP
DRIVING WHEEL WITH THREE TEETH TO CORRESPOND WITH TEETH OF CHAIN WHEEL
VIEW ON A.A

Fig. 7.—Layout for mechanical lubricator on a Baker Perkins Simplex oven.

chains and actuated by means of the chain rollers themselves. It is seen that synchronisation of the drops of oil is provided by telescopic unions to the outlet nozzles. They gave good service, many hundreds being in use today on all types of chains. Their disadvantages were due to difficulties in fine regulation, small single drops of oil were not always obtained and their method of pump actuation did not easily allow of other adaptations where it was not possible to fit them over the top of the chain. The trouble with chain lubricators that take their drive by lever from the perimeter of the chain links themselves, is that any variation in the diameters of the rollers will affect the movement of the lever and the amount of oil fed. When fitted to new chains, this discrepancy does not arise.

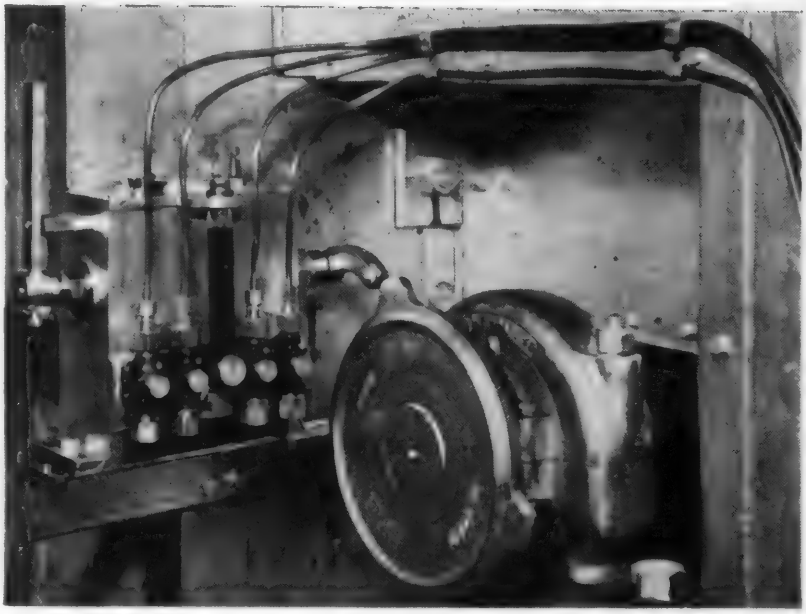

Fig. 8.—Lubricator fitted to a Baker Perkins Simplex oven. In the position shown, the lubricator has just delivered four drops of oil.

It is generally sufficient for every link of a chain to have a maximum of two spots of oil once every eight hours' working, although this may be varied to suit special circumstances.

The latest type of chain lubricator is illustrated in Fig. 5, and this type may have two, four, or six feeds. The lubricator is fitted with a sight level gauge, one adjuster for all feeds, and independent pumping units driven by four rocker arms keyed to one shaft and actuated by the lever, which may be in contact with the rollers of the chain or any other method to provide synchronisation with the movement of the chain. This type of lubricator can be fitted on either side of the chain, and the distance from the chain can be varied by having any length of extended rocker shaft.

Intermittent Link Lubrication

To lubricate consecutive links of an oven chain during use is unnecessary and causes overfeeding of the lubricant. The method adopted is to feed oil to every "nth" link of a chain, and "n" can be such that every link gets a spot of oil in every eight hours or as required. On a small pitch chain, and particularly a fast moving one, this method is admirable. Fig. 6 shows an example of this on a biscuit oven. Another valuable result of this system is that it avoids any fumes. Rapid feeding to every link may cause some fumes that are objectionable if feeding near to the oven operator on a chain that is hot. Although only the lightest fractions of the oil may vaporise off, some oven attendants may object to the slightest smell.

One of the best methods of lubricating an oven chain is shown in Fig. 7, illustrating the layout of a chain lubricator fitted to a Baker Perkins Simplex type of oven. It is seen that a special wheel is fitted to the oven chain wheel shaft for actuation of the lever on the chain lubricator. The teeth, or cams, on this wheel are in synchronisation with the teeth on the main sprocket wheels. In this system any variation in the size of the chain rollers does not affect quantities fed. In the example shown oil is fed to every fifth link of the chain. There are fifteen teeth on the main driving sprocket wheel inside the oven, and by using a three-tooth wheel for driving the lubricator, the delivery feeds can be positioned so as to drop oil on to every fifth link. (See Figures 8 and 9.)

When lubricating oven chains by the above system, care must be taken to ensure that the total number of links in the chain is not exactly divisible by "n." If this were so, the same links would be lubricated on every revolution of the chain.

A Foolproof System

This method has been found satisfactory and lubrication can be carried out while the oven is at work. On the old system of driving the lubricator from the chain rollers and lubricating every link, a certain amount of overfeeding was inevitable. Also in the case of a rapidly moving chain, the movement would soon cause wear of the lubricator. In the case of a totally enclosed oven like the Simplex,

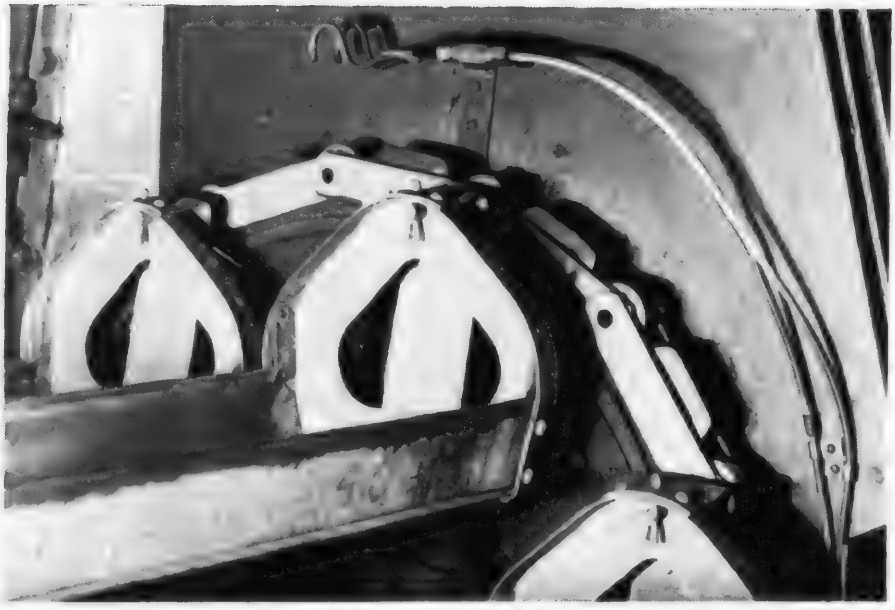

Fig. 9.—Layout of delivery nozzles from lubricator of Fig. 8.

any fumes would be obnoxious and overfeeding must be avoided. Feeding to every fifth link in this manner does not cause fumes and the lubricator can be left on at all times, hence the system is foolproof.

Any type of chain can be lubricated in this way, and by employing a suitable cam wheel for actuating the lubricator, it is possible to ensure just the correct amount of oil required according to the speed of the chain and the number of hours work-

Two feeds per chain are shown in the illustrations, but it is frequently necessary to employ four according to the type of chain joints. Feeding between the links may not lubricate the roller pin and/or bush, and in these cases four feeds are needed for each chain.

Care must be taken when calculating the number of teeth required on the cam wheel to ensure that lubrication of every link will be effected. For example, if "N" be the number of links in the chain and "n" be the number of links between each drop of oil, it is not merely sufficient in all cases to ensure that "N" divided by "n" leaves no remainder. It is important that the remainder be no common factor of "n." For example, if a chain has 236 links it would not be possible to lubricate every sixth link, since only all even numbers of links would be lubricated, the odd ones would always be omitted. If lubricating every third, fifth, seventh or eleventh links, however, providing "N" is not exactly divisible by these numbers, every link will receive lubrication since there are no factors of these numbers. Synchronisation in all cases is obtained by means of telescopic unions for the delivery nozzles.

When it is not possible to arrange a drive for the type of chain lubricator shown, a chain drive to a rotary-driven lubricator can be employed. By suitable ratios of chain wheels, feeds can be made to links at any interval so that "n" can be such as to provide complete lubrication of the chains once every working shift.

Experiments are now being made to find a better fluid than oil to act as a carrier for the graphite. It is hoped to find one that has a sufficiently high boiling point to allow penetration of graphite to a chain at over 750° F. without leaving any trace of harmful deposits.

Acknowledgments are made to Prest's Bakery, Blackburn, for permission to photograph their oven, to J. and W. Kirkham for permission to reproduce illustrations of their chain lubricators, and to Snowdon, Sons and Co., Ltd., for information on which this article is based.

Food Protection

THE protection of foods, fabrics, tools, and other household goods from mould and rust by a new kind of glasslike mineral bead that draws water from the air was discussed by C. H. Lecthaler at a recent meeting of the American Chemical Society. Excessive moisture, which hastens the deterioration of drugs and food, can be absorbed by the use of the beads in packaging, and such foods as crackers and pretzels can be kept fresh and crisp if they are placed in tight-fitting containers with a few beads. Salt and sugar can be prevented from caking in humid weather if mixed with the bead, the mineral being a silica-alumina compound which is chemically inert and does not impair the flavour or nutritive value of the food with which it comes into contact.

Fats in Human Nutrition

PART II

The first part of this article on the existing causes of fat shortage and hopes of improvement in world supplies, discussed at a recent meeting of the Scottish Group of the Nutrition Society under the chairmanship of Professor J. N. Davidson, M D., was published in the August, 1948, issue of FOOD MANUFACTURE. In this instalment, fish oil production, the culinary value of fats, their nutritive value, and some considerations of their influence on health are described.

Fish Oil Production

THE U.S.A., Canada, Norway, and Iceland are the main producers of fish oil. Before the war there was a large production in Japan, and this activity has been recommenced, although on a much smaller scale. The fish chiefly used are the sardine, herring, and menhaden. In many parts of the world these fish are caught deliberately with the intention of making oil and meal, while in others the offal from cannery operations is used. Although signs of over-fishing have been noticed in some areas, such as the Californian sardine fisheries, there are good general prospects for increasing supplies of fish oil. Thus in South Africa pilchards are being increasingly exploited as a source of oil and meal.

Hopes of increasing fish oil production in Britain are naturally centred on the herring, which contains a high proportion of oil at a certain stage in its seasonal and reproductive cycle. Since about 1913 our herring industries have been restricted in one way or another on account of the dwindling of former export markets. Government assistance, under the auspices of the Herring Industry Board, is now being given for the development of facilities for the production of oil and meal from catches surplus to those required directly for human food, and the first full-scale factory should be operating this summer. By 1951 it is hoped to deal with 175,000 tons of herrings, which should provide about 25,000 tons of oil. This target greatly exceeds the present production of 500 tons annually, or even the maximum production of 10,000 tons which could be produced with our present fleet if factories for processing the fish were available. With catches at the 1913 level, however, it should be possible to provide 60,000 tons of oil per annum, or some 3 lb. per head of our population.

Fish Oils in the Factory

For the successful production of herring meal and oil much depends on efficient methods of processing. It is reassuring, therefore, that the Herring Industry Board is insisting that the most efficient plant for this purpose should be installed, even if some slight delay in getting into full operation should be entailed. For the manufacture of margarine, herring oil in common with other fish oils is inferior to whale oil in being rather more highly unsaturated, which means that more hydrogen is used up during the hardening process. Both whale and fish oils, however, have an advantage over vegetable oils in containing fatty acids with 16, 20, and 22 carbon atoms, in addition to the more common acids with 18 carbon atoms. In the hardened product this wide selection of acids confers plasticity over a wide temperature range, which makes the margarine easy to spread.

A novel method of processing herring oil, without resorting to hydrogenation, has been introduced in Norway. The oil is heated out of contact with air until partial polymerisation has been effected. The resulting oil has greatly increased stability of storage, and has completely lost its fishy taste and odour. It is used by the Norwegians for a wide variety of purposes, including frying, baking, and as a salad oil. In the canning of brisling and sild it serves as a satisfactory substitute for olive oil. It is to be hoped, however, that the new process will not replace hydrogenation in this country until adequate tests on the digestibility and physiological utilisation of the polymerised oil have been carried out.

The Culinary Value of Fat

The amount of fat required for good cooking, and to ensure palatability of food, has been carefully investigated by Miss M. H. Craig and her colleagues at the Edinburgh College of Domestic Science. They consider that the present ration of 3 oz. butter, 4 oz. of margarine, and 1 oz. of cooking fat weekly is quite inadequate. The worst sufferers are those living alone or in small families, particularly if they are prevented by age, infirmity, or poverty from taking any meals away from home. In practice it is found to be much easier to spare fat for cooking when catering for large numbers of people than when catering for small numbers. Inadequate cooking facilities, such as restriction to a single gas ring or electric point, also place a great strain on the fat supplies, since the

difficulty in cooking tends to increase both the consumption of butter on bread and the preference for rapid frying over other forms of cooking. Since cooking in deep fat leads to much less wastage of fat than that caused by the ordinary frying pan it would be a useful step if domestic consumers were given a single large ration of fat sufficient to start deep frying. Such extra allowances are already given to fish fryers in canteens.

In large-scale catering non-priority canteens under category C find their fat allowances inadequate, but canteens under categories A and B have sufficient. In the home more fat would be appreciated by the housewife, who during the last nine years has attempted to make the most of her slender rations by means of improved cooking. Food, she finds, is often at its best when cooked with fat, being pleasing to the eye, the palate, and the sense of smell. Even thick soups and vegetables may be greatly improved by the judicious introduction of fat.

Cakes and Pastry

In making pastry a proportion of fat to flour of ½:1 is necessary, a smaller proportion resulting in a hard and chippy texture. The same proportion is required for good cakes, and even two-thirds of fat may be used if a very high quality is desired. The use of smaller amounts of fat has often been counteracted in home baking by an increased use of baking powder, with results which are detrimental to the food value of the product. In the shops cakes have largely been replaced by fancy breads baked with yeast, but these have the disadvantage of going stale very rapidly.

Miss Craig commented on Sir Jack Drummond's recent assertion that our present intake of fat, estimated as 85 per cent. of the total amount of visible and combined fat which we were consuming before the war, is still sufficient to provide a balanced diet. This optimistic statement seemed surprisingly at variance with the opinion reached by scientists before the war, when the consumption by a large proportion of our population was held to be inadequate, and an increase to 3 oz. or 4 oz. daily was recommended. If we hold the opinion that presentation, texture, colour, flavour, and artistry in cooking are as important as calories, vitamins, and mineral salts in deciding the ultimate value of our food it is obvious that our fat ration needs to be raised considerably. An allowance of 1¼ lb. to 1½ lb. per person weekly for cooking and table use is required.

The Nutritive Value of Fats

The edible fats vary considerably in their vitamin contents, but Dr. J. A. B. Smith of the Hannah Dairy Research Institute, Ayr, has found little support for the view that they differ widely in their other nutritional properties. Their component acids may be considered to fall into three classes:

1. Palmitic, stearic, and oleic acids, which appear in all edible fats, animal and vegetable, and which therefore cannot be expected to cause significant differences in nutritive value.
2. The more unsaturated acids, such as linoleic, linolenic, and arachidonic. These acids are readily oxidisable, and can be shown to be essential in small amounts for the nutrition of rats. For this reason they have sometimes been described as "vitamin F," although it remains uncertain to what extent they are required by man.
3. Volatile fatty acids, such as butyric, hexanoic, and octanoic, which confer taste and smell, but which have doubtful nutritive value.

In deciding the absorbability of fats the melting point seems to be the most important factor. About twenty-five years ago Langworthy and other American workers reported extensive experiments on numerous animal and vegetable fats. They found that most fats were absorbed by human subjects to the extent of 95 per cent., the few exceptions being fats with melting points well above body temperature. With partially hardened fats, or mixtures of completely hardened fats blended with unsaturated oils, absorption was almost complete provided that the melting point was kept below 46° C. Raising of the melting point above this limit, however, entailed a sharp decline in absorbability, and at 53° C. only 79 per cent. of the fat was absorbed.

Experiments with Butter

The idea that butter possesses unique nutritional properties apart from its value as a source of vitamins has been the subject of strenuous controversy over a prolonged period. One group of American workers, using rats as their experimental animals, found that growth was better with a diet containing butterfat than with a diet containing maize oil. The maize oil, however, could be made equal to, or even superior to, butter by including the solid fatty acid fraction from the latter. The unsaturated and volatile acids, on the other hand, did not have this effect. Other workers found that butter gave better growth than maize, soya bean, olive, or peanut oil in very young rats when the carbohydrates of the basal diet were supplied as milk sugar, but not when other forms of carbohydrate were given. A group of Dutch workers, on the other hand, found that summer butterfat gave better growth in rats than rape, olive, or peanut oils when incorporated in a basal diet not containing milk sugar. In their experience the superiority of butterfat could be attributed to the presence of vaccenic acid, an isomer of oleic acid, which they succeeded in isolating.

Unfortunately almost all these observations have been disputed by other workers, and the evidence for the superiority of butter has been left in a very inconclusive state, at least as far as the rat is con-

cerned. In the nutrition of calves a much more consistent story can be told, since growth with skimmed milk containing highly unsaturated vegetable oils, such as maize, cottonseed, and soya bean oils, has been found consistently to be lower than with whole milk, or with skim milk containing more saturated fats such as lard, tallow, or coconut oil. These observations emphasise the fact that different species of animals differ widely in their ability to digest and utilise fat, and indicate that reliable conclusions as to the value of the various fats for humans can only be drawn from experiments carried out on human subjects.

Butter v. Margarine

Recent experiments by Leichenberg and his colleagues on the relative values of butter and margarine in sustaining growth in children have therefore provided information of crucial importance. One large group of children, of ages six to seventeen years, who were housed in one institution, received butter as their main source of fat, while in another institution a similar group of children received margarine. The test period lasted from six to twenty-four months in different cases, and the conclusion was reached that the children grew equally well, and enjoyed the same general state of health, irrespective of whether they were given butter or margarine.

Butter can therefore be considered to differ from modern margarine, which is fortified with vitamins A and D, only in its texture and flavour. Even the rat, which does not seem sensitive to good or bad tastes in food as judged by human standards, has been reported to appreciate the flavour of butter. Thus rats which were given a diet in which the fatty component was flavoured with diacetyl to resemble butter ate larger amounts than animals which were given unflavoured fat. In Leichenberg's experiments the peculiar psychological kinks of the human genus were strikingly exemplified, since the children accepted their margarine readily when it was dyed yellow and made up in pats, but objected to it when it was colourless and not made into pats.

Heated Fats and Cancer

It is well recognised that certain forms of cancer may be induced by the prolonged action of certain chemical agents, or carcinogens. Thus lesions may be produced by painting the skin of mice with coal tar extracts. Claims have been made that fats, and certain fatty constituents of fats such as cholesterol, become carcinogenic when they are strongly heated, and have the property of inducing cancer in the intestines of mice.

Dr. P. R. Peacock, of the Glasgow Royal Cancer Hospital, has studied the effect of feeding mice over a prolonged period on diets containing an edible fat which had been heated to over 350° C. In a few instances a careful examination of the walls of the stomach revealed lesions which were considered equivalent to gastric cancer in the human subject. More experiments will obviously be needed before heated fat is definitely incriminated as a cause of human cancer, but it would seem wise to avoid the repeated heating of fat as far as possible. Under conditions in which repeated heating cannot be avoided, as in the commercial frying of fish and potatoes, care should be taken to avoid overheating the fat.

Fats and Health

While most of us would appreciate a higher fat ration, which would enable us to enjoy a more varied and palatable diet, there is little conclusive evidence that our health is liable to suffer if our appetite for fat is not fully satisfied provided alternative foodstuffs are available in adequate amounts. It has, indeed, sometimes been suggested that the incidence of tuberculosis is high in communities receiving inadequate amounts of fat, while during the war scaliness of the skin on the arms and legs was supposed at one time to be due to fat deficiency. In the case of tuberculosis the case might be described as "not proven," while carefully controlled experiments on the skin lesions have usually indicated that factors other than fat deficiency were involved.

In the opinion of Dr. Magnus Pyke, of the Ministry of Food, there is no reason either to consider that our present diet is unduly low in fat, or to suspect that the slight reduction in our fat consumption below the pre-war level has had a bad effect on our health. Statistics in regard to adult and infant mortality indicate a general improvement in the nation's health, and it seems probable that a better balanced diet for the mass of our population has largely helped in attaining this improvement. The present ration of "visible" fat is supplemented by a considerable "invisible" contribution in our milk, meat, eggs, bacon, herrings, and other foods rich in fats. In all about 38 per cent. of our calorific intake is derived from fat. Before clamouring for an increased fat ration for this country we should remember the much lower rations upon which less fortunate countries, such as India, have always had to subsist, and ask ourselves whether our demands are fair and reasonable.

In deciding how far the British diet should be influenced by the food supplies which are available to other countries, our ethical convictions and generous instincts must be carefully balanced against cold common sense and a reasonable instinct for self-preservation. It may be a comforting thought, however, that even if our present fat ration tends to lead to a monotonous and unappetising diet there is no medical evidence that a slightly reduced intake of fat is injurious to health.

Coal, Oil, and Gas

AT the basis of the preparation of food are the essential raw materials on which industry must rely for providing heat, power, machinery, and the thousand and one things that go towards meeting the requirements of that much maligned state of mankind known as civilisation. Of the annual value of the output of the mineral raw materials of the world, nearly half is represented by fuel in its various forms of coal, oil, and gas. In this country we have been prodigal in the past in the use of our indigenous resources of coal, and as the result of wasteful habits we were during the war within an ace of having our munitions industries seriously handicapped by shortage of coal.

Fuel in Industry

Fortunately there existed many engineers and technologists with expert knowledge in the use of fuel, who were mobilised by the Ministry of Fuel and Power in their efficiency campaign. As a result the practice of using fuel in industry was improved, and the realisation brought home to all that coal conservation is a vital factor in our national economy and prosperity. That body of knowledge on which the preparation, manufacture, and use of fuel is based is known as fuel technology. Accordingly, a recently published book* devoted to the elements of this branch of technical science must be at the present time of considerable importance.

In common with other branches of technology, there is a serious dearth, as the result of the war, of textbooks covering the fundamental principles of this subject. The virtual hiatus of ten years in those activities which result in the production of books appears all the more significant when it is realised that the boundaries of scientific and engineering knowledge are rapidly growing, and to some extent the experiences of the war have accelerated such a growth.

Wide Scope of Fuel Technology

Further, so wide are the uses to which fuel is put in industry that this branch of technology has become an applied branch of almost all the physical sciences. In attempting, therefore, to cover the whole subject in one volume, the author undertook a task of substantial dimensions. Any success achieved must accordingly be commended; any shortcomings may be condoned as attributable to the magnitude of the task.

In many respects this volume constitutes a revision and extension of a former volume entitled, *Coal: Its Constitution and Uses*, in which Dr. Himus collaborated with the late Professor W. A. Bone. Many of the virtues of that earlier successful volume are retained, but in the new sections, entailed by the widening of the title, the book has suffered from the circumstance that the script was completed in 1943. Thus, references to important new developments, such as the production of oil from coal, and that important field of practice, utilisation, do not include mention of modern work. Thus, for example, in Chapter XVII on Coal as a Source of Liquid Fuels, the latest reference in the bibliography at the end of the chapter is dated 1938, but in the intervening period both the Germans and the Americans have made substantial advances in this field, and new techniques have been developed.

The book is well written and clearly printed. There are some 113 diagrams and over 100 tables of technical data. While there are useful lists of references at the end of each chapter, they suffer from the absence of really modern items, and the selection leaves much to be desired in directing the reader's attention to the best sources of detailed information in the literature. In spite of these shortcomings, the book is a valuable contribution to an important subject, and it should appeal to a wide circle of readers.—R. J. S.

* *Elements of Fuel Technology*. By G. W. Himus, Ph.D., A.R.C.S., D.I.C., M.I.Chem.E., F.G.S., F.Inst.F. London. Pp. 506+xvi. Price 42s. net.

Mashed Potato Powder Litigation

THE following is a copy of the Court Order made in the High Court of Justice, Chancery Division (Group B), Mr. Justice Wynn-Parry, on Wednesday, July 21, 1948:

IN THE MATTER OF THE PATENTS AND DESIGNS ACTS 1907 to 1942

and

IN THE MATTER of Letters Patent number 525043 granted to ZELMANAS VOLPERTAS

UPON THE PETITION of Chivers & Sons Limited on 22nd November 1945 preferred unto this Court and UPON HEARING Counsel for the Petitioners and for the Respondent Zelmanas Volpertas and UPON READING the said Petition the Particulars of Objections and the Answer of the Respondent thereto and UPON HEARING the evidence taken orally before this Court.

AND the Petitioners and the Respondent by their Counsel stating that they have come to terms for the settlement of the matters in dispute between them and consenting to this Order.

THIS COURT DOTH ORDER that the said Petition do stand dismissed out of this Court.

AND THIS COURT DOTH CERTIFY that the validity of the above-mentioned letters patent came in question on the hearing of the said Petition.

Food from Vegetable Wastes

In recent years a great deal of attention has been given in America to the problem of vegetable crop wastage which is largely represented by foliage plus stem material. It is true to say of most vegetable crops that 70 per cent. to 75 per cent. is not eaten. As a residue, however, the wastage has the disadvantage of being at least 75 per cent. water, and the development of products from wastage of this nature must be associated with a drying process at an early stage, otherwise handling costs will outweigh any real hopes of economic success.

ACCORDING to a paper by J. J. Willaman and R. K. Eskew (of the Eastern Regional Research Laboratory) in the current U.S.D.A. Year Book, certain basic conditions in treating vegetable wastes are essential. The wastes must be produced abundantly and in a fairly localised area. A succession of suitable wastes must be available to ensure that drying plant runs for a fairly long season. And, obviously enough, the wastes must contain valuable constituents.

U.S.D.A. research has so far concentrated upon the technical aspects of waste treatment, first, recognising the value of vegetable wastes and, second, devising methods of producing "concentrates"; it has been left to private enterprise to decide whether economic development of these methods is practicable in well-chosen areas. In view of the fact that good-class protein foods for poultry can be produced—food of which we have a much more urgent and vital need than the Americans—it is probable that these waste utilisation schemes will be more attractive economically here than on the other side of the Atlantic. Certainly the American research work should be closely studied.

Production of Dry Meal

The product aimed at is a dry meal largely derived from leaf. It is the leafy part of vegetable waste that contains the most nutritious material. From most wastes it is possible to produce leaf meals of high protein content, good carotene content, and useful fat value, associated with quite low proportions of crude fibre. Twenty-five per cent. protein is a reasonable average value; a leaf meal from broccoli waste has actually reached 44 per cent. Carotene values range from 300 to 800 I.U. per gram.

The pilot process work in America combined the drying operation with a separation of leaf tissue from more fibrous stem and leaf-rib, advantage being taken of the fact that the thinner leafy material will dry more rapidly than the thicker stems and ribs. Drying is stopped at a stage when the leaf is brittle, but the fibrous material is still wet enough to be tough; the total waste is fed to a hammer mill without screen. An air current is then used to separate the two fractions, the light and broken-up leafy matter being blown away from the other and heavier matter. This method has been developed to give a separation efficiency of as much as 95 per cent.

Drying Operation

For the drying process an incoming air temperature of 240° F. with air circulating at 175 cubic feet per square foot of bed is desirable. For general use a triple-belt continuous drier with a total drying area of about 930 square feet is recommended; such a drier, with an 8½ foot belt operating on the three-deck principle, would be 40 feet long. The hourly production rate would be between 300 and 1,200 lb. of dried and separated leaf meal; the hammer mill in this flow-line would, however, have to be capable of handling up to 2,000 lb. per hour of total, unseparated material.

The air separator is based on the usual fan and cyclone arrangement, but with pipes of fairly large cross-section. The separated leaf material is finally ground.

According to the types of waste initially fed to the drier, the total costs of the leaf meal run between about £5 10s. and £24 per ton.

Vegetable Leaf for Mash Rations

Feeding tests at research centres and a commercial poultry farm have shown that vegetable leaf meals can be safely used to replace alfalfa meal in mash rations; where the vegetable leaf meal has a high enough carotene content, its use in a mash can also replace or reduce the usual addition of fish liver oil.

In laying tests with several hundred birds, 5 per cent. of alfalfa meal and 0·5 per cent. of fish liver oil in the mash were replaced by 2·5 per cent. of broccoli leaf meal; over three months slightly better egg production came from the birds on the broccoli meal. In similar tests for hatching, equal performance was obtained where broccoli leaf meal had been used.

Leaf meals from pea vines, bean vines, turnip and carrot tops have all been successfully used as poultry feeds. Even spinach, beet, and rhubarb

leaf meals have been satisfactorily used up to levels of 3·8 per cent. of the mash ration, despite the possible troubles due to oxalic acid content in these cases. . Waste lettuce has also been processed.

High Quality Standards

It can hardly be doubted that the performance of poultry feed with these new meals has been studied from a high quality standard in the United States, where there is no desperate shortage of normal feeds. The vegetable waste leaf meals have had to prove themselves under what might be called quality conditions. The average British poultry keeper would certainly look at the leaf meals from a more quantitative viewpoint; it would not be a question whether they would give him the same superiority as a more customary feedingstuff, but whether they would enable him to keep more birds or give more protein to his existing flock. In America the development of vegetable leaf meals depends upon two factors—finding the right spots where enough waste can be handled over a long enough period, and subsequently finding enough poultry keepers willing to pay a fair price for the leaf meals having regard to their protein and carotene contents. In Britain there would be no trouble in securing the second condition, and it should not be impossible to meet the first.

As one American grower is reported as saying after studying analyses of various vegetable leaf meals, "I am wondering if we humans aren't eating the wrong parts of the plants!"—D. P. H.

REFERENCES

Willaman and Eskew. "Uses for vegetable wastes." *U.S.D.A. Year Book* (1943-1947).

Delaware Agricultural Exp. Station Bull. 247, (1944). "Use of certain dried vegetable wastes as poultry feeds."

Industrial Medicine

A USEFUL little book* on the practice of industrial medicine, which should certainly be on the shelves of all large industrial firms and of those who are concerned with claims for workmen's compensation, has been written by Dr. T. A. Lloyd Davies, the chief medical officer, Boots Pure Drug Co., Ltd.

The author has not hesitated to cover the whole field of industrial medicine in its widest sense, and has chapters dealing with what constitutes industrial medicine; its historical aspect; medical examination; accidents, fatigue, and environment; the social functions of industry; industrial disease and toxicology; the hazards of coal mining (written by Dr. G. F. Keatinge); workmen's compensation and rehabilitation; and the future.

**The Practice of Industrial Medicine.* By T. A. Lloyd Davies, M.D., M.R.C.P., with a chapter on the Hazards of Coal Mining by G. F. Keatinge, M.D., D.I.H. London. Pp. 244+vii. Price 15s. net.

There is a wealth of experience and wisdom contained in Dr. Davies' book, as for instance his suggestions regarding fatigue, the necessity of taking all precautions as far as possible independent of the worker, attempting to see that they do not undergo unnecessary strain outside the factory, etc. While it is not possible to prevent an anxious youngster from striving to improve his position by study outside factory hours, there are frequently witnessed the bad effects of too many part-time students in an organisation, as regards both the difficulty of arranging work and of the fatigue and irritability not only of the individual concerned, but also of his fellow workmates. Apart from work there are too many cinemas, dance hall attendances, and other night attractions which may do as much damage to health as the stress of keeping up with modern machinery during the daytime.

Industrial Poisoning

To the chemist the second portion of the book, dealing with actual poisons, is more interesting, each substance mentioned being dealt with in monograph form in brief, but with all essentials. Items which will appeal more especially to food manufacturers are those on the use of detergents, especially synthetic detergents, and solvents, such as might be employed for the extraction of oils and fats. The author deals effectively with the matter of dermatitis, and finds space to discuss the relative susceptibilities of blondes and brunettes. He also points out that if one is susceptible to one chemical one is more likely to become susceptible to another, and indicates that the popular belief that mustard gas is peculiar, in that one becomes more susceptible with every exposure, is incorrect, and that this tendency holds for most compounds. Fortunately, most members of the community are not particularly liable to dermatitis, but it does explain why many employers find that employees become susceptible to soda and, on changing to synthetic detergents, appear to be free for some time and then suddenly become even more affected.

In view of its importance for fumigation, one would have liked to see a little more space devoted to hydrogen cyanide gas and reference should have been made to it in the index, but it must be remembered that the volume is not written primarily for one industry, and that the author's outlook is naturally moulded largely by his personal experience. It is this personal touch which is most important in a handbook.

All told this is an excellent introduction to larger volumes, and some of the terse sentences are well worth repetition, *e.g.* "All industrial diseases are preventable"; "Finally, chemists, physicists, engineers, electricians, and others must be consulted to find a means of avoiding the hazard."

There is an excellent bibliography at the end of each chapter.—T. McL.

The Vegetarian Cult

M. SCHOFIELD, M.A., F.R.I.C.

The present shortage of meat necessitates the falling back on bread plus whatever vegetables are available to form a substantial part of our sustenance. Those Ministry of Food advertised recipes of the last year or two, recommending vegetable dishes in such rosy terms, have appeared by a coincidence as if in celebration of the founding of the Vegetarian Society of England, a founding which itself coincided with the death of William Lambe, pioneer of such "reformed" diets.

BEFORE societies and pioneers like Lambe came to establish vegetarianism as it is known today, there was a classical opening to this theme of abstinence from all flesh-eating. If we are to believe Ovid, the Golden Age saw men living upon the fruits of the earth and upon such natural gifts as kind Nature bestowed on them "nor stained their lips with blood." There were the law-givers of primitive Egypt prohibiting flesh foods; and Brahmins with their highest castes eating no meat, with the lowest indulging in it—a contrast to conditions in European countries. Throughout the centuries a theme dominating the vegetarian cult was the belief that flesh-eating promotes animal passion, and is therefore adverse to philosophic and spiritual development. An early exponent of this theme was the philosopher Porphyry, born at Tyre in A.D. 233, who, in dying at Rome seventy years later, completed a good span to support his view. In his work *Abstinence from Animal Food*, he wrote for the man who wishes in the present life to liberate himself as much as possible from the fetters of the "corporeal nature," in order to elevate his intellectual eye to the contemplation of "truly existing being."

Vegetarianism in the Nineteenth Century

It was at the beginning of the nineteenth century that activities of disciples of vegetarianism were more in evidence. Among the earliest to practise it in the 1800's was Shelley, the poet who ordered his life by rules of his own, who believed sincerely in what he preached. The *littérateurs* who write much on his life and work often miss two phases of his career: first, his attempts to take up chemistry; second, his vegetarianism which lasted his stay in England from 1813 to 1818. At Eton he was "Mad Shelley," apart from his hatred of discipline and violent temper. For he took up chemistry, had his room littered with chemical materials, his furniture stained with acids, and his carpet having "more than one hole which would elucidate the ultimate phenomena of combustion." In 1813, as part of the notes to *Queen Mab*, first published privately in that year, came his *Vindication of a Natural Diet*, an argument based on his individual experience in connecting health and morality with food. He was influenced no doubt by the writings of Dr. Lambe, but his *Vindication* is in his own prose style and is one of his characteristic essays. Shelley was out to show a bearing of vegetarianism on questions of economy and social reform at a time when social reform was beginning to attract English people. Leigh Hunt describes Shelley in 1817 at Marlow, breakfasting sparingly, writing his *Revolt of Islam* all morning, then going out in his boat and returning home "to a dinner of vegetables." But Shelley after his return to Italy, despite his picturing the day "when man no more slays the lamb that looks him in the face," allowed his abstinence from meat-eating to waver somewhat.

Those in Favour

A few years after Shelley wrote his *Vindication* came further dissertations from converts to vegetarianism, from men who claimed vastly improved health resulting from avoidance of flesh-eating, who pointed as example to native races "enjoying" a diet of fruit and vegetables and being free from ills of civilised races. There were one or two clergymen like the Rev. William Metcalfe with his *Abstinence from the Flesh of Animals*. There was Sylvester Graham, American author of a number of articles on food and one of the strongest believers not merely in wholemeal flour, but in flour from the wholewheat berry including bran and germ. "Graham flour" had an extensive vogue in the United States. This pioneer, in his *Lectures on the Science of Life*, maintained that a pound of rice contains more nutritious matter than 2½ lb. of meat; that 3 lb. of good wheat bread are preferable to 6 lb. of flesh; that 3 lb. of potatoes are more nutritious than 2 lb. of meat. Graham's writings, including his repetition of the old theme that excessive flesh-eating caused the wickedness of man before the Flood, had effect on William Lambe, M.D., F.R.C.P., who takes first place in the Britain of last century as leader in "reformed diet." Howard Williams, in his *Ethics of Diet* of 1907, describes Lambe as "one of the most distinguished and scien-

tific promoters of the reformed regimen. He divides with his predecessor, Dr. Cheyne, the honour of being the founder of scientific dietetics in this country."

Lambe certainly had faith and conviction that his health and active life had returned, after several years of illness, simply because he had forsaken meat-eating in 1806. An early student of cancer, he believed his vegetable diet would relieve this dreaded disease. He certainly won a reputation among his patients as a result of persuading them to adopt more temperate ways. He was no quack; his education had been first class from becoming a Cambridge Wrangler, passing to a medical degree, and being elected a Fellow of St. John's College. And though he made few converts among the medical profession, except John Abernethy, who held most illness to be due to excessive flesh-eating, he commanded respect—as for example in the Harverian Oration before the College of Physicians in 1848, when Dr. Hawkins said that Lambe, even "if he wished, rather rashly, to deprive us of flesh diet, nevertheless he must be forgiven." For Hawkins told how Lambe was no mean chemist, how he had detected lead in drinking water, and how he had his patients drinking only distilled water—a very wise precaution considering the infected state of London water of a century ago. Lambe's death and the founding of vegetarian societies had put the cause well in the limelight. But Liebig's well-known views on proteins, on the necessity of meat in the diet for replacing muscle used up during muscular work, had come to increase opposition. Writers in France waxed satirical on England, country of eccentrics, having many converts to the new cult of abstinence from flesh-eating.

Cheap Food

Two short publications in the 1870's illustrate the type of argument brought forward to seek converts to vegetarianism, arguments written by men ever ready to break a lance or cross a nib in the cause. Under the striking title of *How to Marry and Live Well on a Shilling a Day*, W. Couchman, in a revised edition of his *Man's Best Diet*, put forward three distinct objectives: to show a vegetable diet to be best for man; to show it is the cheapest; and to show the means available "for carrying out the great end of social life, viz. marriage." Couchman maintained that while all carnivorous animals were rapacious and ferocious, a vegetable diet would foster mature docility and goodness. To prove this by experiment he suggested feeding two dogs, A and B, on the two alternative diets and noting the difference in behaviour. Flesh foods nurture ferocity, he argued, for ferocity is necessary in order to obtain supplies of such foods. To train a man to be ferocious in the prize ring, simply train him on raw flesh, as was the rule. Couchman proceeded to give his daily menus: onions, potatoes, haricot beans, peas, greens, vegetable pie, fruit, brown bread and puddings, with only milk and scrambled eggs to satisfy the newcomer to vegetarianism. Four years later T. L. Nichols sought to go one better with his *How to Live Well on Sixpence a Day*, this being published for the Food Reform Society. Here the argument is that since whole nations can live on rice and Scotsmen have lived on oatmeal, why not a diet of fruit, brown bread, vegetables, oatmeal, and other non-flesh foods?

Since those years when Lambe and his followers published the clarion call, there has been no lack of men and women seeking to further the cause of vegetarianism. Examples are too well known to need repetition—to realise this one has but to mention that leading figure, the wit, playwright, and dogmatist, "G.B.S.," who is a vegetarian for the same reason that he is a pacifist: "neither meat-eating nor war puts life to its most economical use." And now just a century after the movement in Britain took practical shape, we are all semi-vegetarians by necessity. Those many recipes coined to by-pass the butcher are vegetarian, with the added difficulty during potato scarcities when both carbohydrate and vitamin C are curtailed.

Packaging Dehydrated Meat

THE packaging of dehydrated beef and pork in air, in vacuum, and in nitrogen in hot-dipped tinplate cans, fused electrolytic plate cans, and "Bonderised" cans formed the subject of research carried out by R. A. Whitmore, David Seligson, H. R. Kraybill, and B. H. Webb. (*Food Research*, 13, **1**, 19). Samples were stored at 135° F., 110° F., 70° F. to 90° F., and at 36° F. to 38° F.

The development of peroxides and of free fatty acid in the meat was determined after varying lengths of storage. No significant difference was found between the air, nitrogen, or vacuum packs, or between the samples in the different kinds of cans. The peroxide value reached a maximum at a rate determined by the storage temperature after which it declined slowly to zero. The free fatty acid content increased slowly but not significantly in one year of storage.

Palatability tests indicated that dehydrated beef and pork remained edible for six months packed in air, nitrogen, or vacuum in metal cans at 135° F.

A number of non-metallic and metal foil, envelope-type packages were tested as containers for dehydrated pork, and it was found that a package made of metal foil laminated to Cellophane was the best of the bag-type containers. The changes in the peroxide value, free fatty acid content, and palatability of dehydrated meat packaged in structurally sound, envelope-type bags were similar to those which occurred in the same kind of meat packaged in cans.

News from the Industry

Lieut.-Col. M. W. Batchelor

The appointment of Lieut.-Col. M. W. Batchelor as chairman of Batchelor's Peas, Ltd., in place of Mrs. E. H. Gasking who recently retired, has been announced.

He is also to be chairman of Poulton and Noel, Ltd., which will shortly be known as Batchelor's Peas (Southall), Ltd.

Col. Batchelor is a Sheffield magistrate and former City Councillor; he served in both world wars and in all three Services.

He is President of the British Commercial Travellers' Association, a member of the Grand Council of the Federation of British Industries, member of the Executive Committee of the Fruit and Vegetable Canners' Association, member of the Executive of the Industrial Welfare Society, and a Fellow of the Incorporated Sales Managers' Association.

New Overhead Conveyor

Besides operating horizontally and negotiating right and left hand bends, a new type of overhead conveyor manufactured by Fisher and Ludlow, Ltd., also rises vertically, enabling the adoption of continuous line production. The horizontal distance of 16 feet along which an article must travel to be raised is not increased, even when a lift of 16 feet is required. In addition, the conveyor can manoeuvre in narrow spaces and can operate as a continuous line in a multi-floor building, thus avoiding the necessity of manual handling of goods between individual systems.

All stresses are contained inside the track itself; the only force exerted on the structure of the building is the dead weight of the conveyor and its load, the pressed steel construction keeping the roof-load to the minimum. The conveyor is easily erected, the parts being standard and fully interchangeable.

New Whaling Base

Recent reports indicate that Ayr may become a whaling base since unloading can be effected there more speedily than at an English base. A Norwegian ship, fishing off the Faroe Islands, landed her cargo of whalemeat at the port as an experiment recently and other whaling vessels are expected at the port soon.

Lectures on Oils and Fats

A course of twelve post-graduate lectures in the chemistry of oils and fats will commence on September 24, at the Acton Technical College. Recent advances in inorganic and physical chemistry will form the subject of a further course of twelve lectures commencing January 7, 1949. It is also hoped to arrange a short course in biochemistry in 1949.

Evacuated Bimetal Switches

The load-limiting and time-delay switches produced by Sunvic Controls, Ltd., are totally enclosed in strong evacuated glass tubes, so that arcing at the contacts is reduced to a minimum, oxidisation of the contacts is prevented, and danger of explosion in locations where there are volatile vapours is eliminated.

Amalgamation

Arrangements have been completed for the purchase of Gregory's of Liverpool, Ltd., and its subsidiary, R. Gregory and Sons, by Brown and Bibby, Ltd. For the time being the two concerns will operate separately, but in the near future the whole of Gregory's plant now at the Hunt's Cross factory will be accommodated at Speke.

Market Research in Export Drive

APPEAL FOR USE OF SERVICES

The "no hawker, no circular" attitude which sometimes existed in British industry and trade was deprecated by the President of the Board of Trade in his speech at the third annual general meeting of the British Export Trade Research Organisation held in June.

Mr. Wilson, speaking of the urgent need for the expansion of exports, said that the export salesman would find his work frustrated unless his firm were directing their attention to producing what the market needed. This was the gap in pre-war selling arrangements which the organisation was created to fill. Its aim was to provide an instrument for market research abroad, and from the first it had worked in closest co-operation with the Government and its representatives abroad.

The Government were disappointed that it had been found necessary to render financial assistance to the organisation, since they felt that industry should have been only too glad to pay for those services being offered. It was realised, however, that the sellers' market would come to an end and if export trade was to be developed during the move into the buyers' market, the exporters would have to be very much more efficient in every way, with an ability to take advantage of every opportunity in markets abroad and to create opportunities in new markets. All the information necessary for the increase of exports could only be obtained by a most careful study of the results of a penetrating market research—a service which the organisation was fully qualified to perform—and therefore it had been arranged that during the transition period it should be assured of some income from the Government, provided that industry also played its part, not merely in terms of payment for commissions executed, but also in terms of subscriptions from British industry as a whole.

He welcomed the decision made that morning when the organisation had agreed to make its services available not only to member concerns but also to the whole of British industry, and he appealed to firms who had never exported before but were now being forced into the export field as well as those expanding their export activities for their support.

The Film in Scientific Research

ASSOCIATION'S ONE-DAY CONFERENCE

A one-day conference on "The Film in Scientific Research," which is to be held on October 12, 1948, at The Royal Institution, London, has been arranged by the Sciences Committee of the Scientific Film Association. This conference is being held the day after the end of the International Conference so that overseas visitors may have an opportunity to participate. The chair will be taken by Mr. J. E. Cummins, Chief Scientific Liaison Officer in London of the Australian Government, and the business of the conference, which will be opened by Sir Robert Watson-Watt, C.B., F.R.S., will be as follows:

(i) Discussion by British and foreign scientists as to the value of scientific films as a research tool in various branches of science (astronomy, biology, chemistry, physics etc.) during which suitable examples will be shown.

(ii) Discussion as to the function which the research film can play in giving up-to-date information to scientists working in a particular field.

(iii) Scientific films as an aid to the training of scientists.

(iv) Scientific films as a medium for explaining to the general public important results of scientific research.

(v) The technical aspects of the use of films in scientific research.

It is hoped that there will be time for a general discussion, when any points not previously mentioned can be raised.

The conference will conclude with a two-hour showing of British and foreign research films.

Material suggested for discussion, and any information as to the existence or availability of any research films suitable for showing at the conference, should be sent to the Hon. Secretary, Sciences Committee, Scientific Film Association, 34, Soho Square, London, W.1, as soon as possible.

Tickets and further information regarding the conference can be obtained from the aforementioned address.

B.I.F., 1949

As already announced, the 1949 British Industries Fair will be held in London and Birmingham from May 2 to May 13. As at previous Fairs, certain trade associations are co-operating with the Export Promotion Department in the arranging of uniform schemes of presentation. Participation in these special arrangements is not confined to association members, and exhibitors may wish to take advantage of this and so secure full benefit from the co-ordinated displays.

Interested manufacturers who have not received an application form should apply immediately to either the Export Promotion Department (Exhibitions Branch), 27, Old Queen Street, London, S.W.1., or to the Birmingham Chamber of Commerce, 95, New Street, Birmingham.

Rear-Admiral Derby (U.S. Coast Guard Service) presenting food gifts from the residents of New London, Connecticut, to the Lord Mayor of London.

Obituary

We regret to announce the death on July 7 of Mr. J. W. Collins, director of the Knightsbridge Provision Co., Ltd.

Mr. Collins had served with this company since it was formed eighteen years ago and had been engaged in the food manufacturing industry for the past fifty years.

Industrial Medicine

Operating in various sectio including industrial law, t training of industrial medi officers, and hazards and preve tion in the use of radiant ener the ninth International Congr on Industrial Medicine will be h in London from September 13 17. Representatives from ab twenty-six countries will disc recent advances in the practice this branch of medicine and r search into many aspects modern industrial life, and those working in this field are ing invited to submit papers presentation to the Congre Applications to attend are spe ally invited from laymen who a expert or interested in the vari problems of industrial healt The organising secretary is M G. B. Mawdesley, Room 5 Garden Court Wing, B.M. House, Tavistock Square, W.C.1

New Research Centre

The official opening of the ne research centre of the Printin Packaging and Allied Trades R search Association at Leathe head, Surrey, is expected to ta place in the autumn. The cent which is designed and sited future expansion, houses a tec nical library, laboratories (i cluding a large technological one air-conditioning plant, stor workshop and darkrooms, in a tion to offices and a confere room.

Journeymen Bakers' Report

In their seventy-second ann report, the Journeymen Bake and Confectioners' Pension Soci announce that the additions the society's funds during t year 1947 will enable the d charge of all liabilities for t coming year and the continu extending of relief to pensioners

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Erratum

In the article "Methods for t Estimation of Pectin," publishe in the February issue of Foo MANUFACTURE, the formula a pearing on p. 78 was incorrect printed. It should read as follow

$$\frac{0{\cdot}176(a) \quad 0{\cdot}190(b)}{20} = g$$

Refitting for the next voyage on board the "Southern Venturer." *Leonard Hill Photo.*

R.I.C. Visit Whale Factory Ship

RECORD OIL PRODUCTION FIGURES

Members of the London and South-Eastern Counties Section of the Royal Institute of Chemistry visited the "Southern Venturer" whale factory ship at South Shields on June 23. Travelling down the Tyne by tug from Newcastle, the party was met at the docks by Mr. Russell Little, manager of the Liddle Docks and Engineering Co., Ltd., at South Shields, who had, with Mr. Camilleri of their London office, made all the arrangements for the visit. The visitors were conducted over the 21,000 ton ship by Mr. Reynolds, the Chief Engineer, Dr. Downing, the Chief Chemist, and Mr. Wolstan, Chemist. With its sister ship, "Southern Harvester," it had just returned from its seven months' whaling season in the Antarctic, during which time it had created a record by producing over 40,000 tons of oil.

The vessel is equipped for the production of oil (blubber, sperm, and liver), meat and liver meal. The whales, having been caught from small boats, are towed behind the factory ship until ready for dissection. They are then hauled up a slipway in the stern of the ship, the blubber is stripped off and transferred to one of twenty-four extractors in which it is treated with steam under pressure to extract the oil. The heads are sawn into small pieces which are also extracted with hot water to recover the oil. The waste from this extraction, containing phosphates and glue, is discharged overboard. The back meat is cut, minced, and any shrapnel from the harpoon removed magnetically and the meat dehydrated. The liver is minced, dried *in vacuo* in steam-lined cylinders, and the oil extracted with trichlorethylene. The residue, rich in riboflavin, is packed as a meal. One whale can be so dealt with in 40 minutes, and a 24-hour day is worked.

The vessel, besides being equipped with the necessary machinery to enable all these operations to be carried out while afloat in the Antarctic, also has a chemical control laboratory, and three chemists are included in the total complement of 370.

After the visit the visitors entertained Mr. Little, Mr. Hansen, the Dock Superintendent, and three members of the staff of Chr. Salvesen and Co., to lunch at the "Grotto," after which a hearty vote of thanks was proposed to them by Mr. McLachlan, Hon. Secretary of the London and South-Eastern Counties Section of the Institute, and seconded by Mr. W. Gordon Carey, chairman of the Newcastle Section, to which Mr. Little replied. Mr. McLachlan also expressed the pleasure of the visitors from London in having the company of the representatives of the Newcastle Section on this occasion.

The production figures for 1947-1948 are shown at the foot of the preceding column.

	Production.		*F.F.A.*	*Red.*
WHALE OIL:	*Barrels.*	*Tons.*	(*Per Cent.*)	(*Lovibond Units*).
	203,789	36,967	0.87	4.52
SPERM OIL:				
Carcase	2,487	614.5	0.65	3.65
Head	—		0.15	1.10

DEHYDRATED WHALE MEAT:

Tons.	*Moisture.* (*Per Cent.*)	*Oil.* (*Per Cent.*)	*Ash.* (*Per Cent.*)	*Protein.* (*Per Cent.*)
2,741	5.20	6.15	2.12	86.53

LIVER OIL:

Gallons.	*Vitamin "A" i.u./gm.*	*F.F.A.* (*Per Cent.*)	*Volatile Matter.*	*Dist.*
5,720	31,400	19.58	2.77	½ 0.79

LIVER MEAL:

Tons.	*Moisture.*	*Oil.*	*Riboflavin.*
186	13.02	0.87	100 *Microgram Per Gram.*

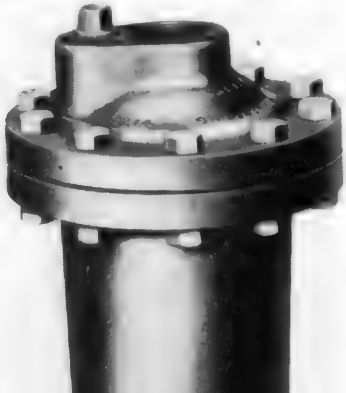
Roadside Cafés

Despite improvements effected by the British Road Federation some ten years ago, the position regarding roadside café facilities for transport drivers leaves much to be desired. The case is clearly stated by the Federation in an interesting illustrated booklet which contains an account of the facilities afforded transport drivers in other countries and concludes with recommendations by the Federation for the improvement of the situation at home.

Steam Traps

One of the chief features of the steam trap manufactured by the Drayton Regulator and Instrument Co., Ltd., is the free-floating lever action which reduces friction to a negligible quantity. All internal parts are made of stainless steel, with the exception of the bucket, which is brass for temperatures up to 250 lb. per square inch, although for higher pressures and for superheat stainless steel buckets are used. Another important point is that this trap is self air-venting and will handle dirt without interference with the action.

The entering steam is trapped and the bucket maintains its buoyancy so that the pressure in the trap holds the valve on to its seat. As condensate enters the trap, the bucket sinks and breaks the valve seal. The valve drops by gravity and the full-bore discharge takes place. On closing, the valve is lifted vertically upwards towards the seat and the velocity of the outgoing condensate lifts the valve lever bodily and discharge ceases at once.



Electric Shocks for Whales

It was disclosed recently by the Minister of Agriculture that a new method of killing whales by electricity is to be tried out in the near future.

Telescopic Stacking Truck

Possessing the advantages of electric battery drive, the high-lift fork stacking truck produced by Ransomes, Sims, and Jefferies, Ltd., handles goods on pallets or direct on forks, while telescopic lifting gear enables it to pass through doorways and under roof girders while still allowing for stacking between the girders. Electric-hydraulic hoisting and tilting is effected by a rotary pump driven by a separate electric motor and the mast is arranged for a backward tilt of 10 degrees and a forward tilt of 3 degrees. The pressure relief valve provided in the hydraulic system, which automatically operates when maximum positions of travel are reached, serves both the hoisting and tilting motions and is also set to guard against overloading.

Gums and Pastes for Labels

Gums for manual and automatic tin labelling, pastes for lap labelling and outer carton sealing, and hot and cold pickup gums are detailed in a small brochure produced by Duché and Knight, Ltd. For use in paper bag manufacture, tin and bottle labelling, and other industrial processes, their products also include jelly, flexible and liquid glues, and high-grade bone glues in granule, powder, and undried form.

Paper Bags for Dried Food

A hermetically-sealed paper bag, loose-laminated with Pliofilm lining, is being made by E. S. and A. Robinson, Ltd. The lining permits natural gases to escape from the contents, while preventing the entry of air, and in this way the deterioration of the product is minimised and natural flavours of foods are protected.

These bags may be used for the packing of table jellies, coffee, tea, soup powders, dried onions, and practically all kinds of dehydrated food.

Alive, Alive O!

The transport of live lobsters, shrimps and other highly perishable sea foods can be accomplished without the aid of refrigeration by packing in insulated boxboard cartons lined with Pliofilm.

Recently a cargo of live lobsters, which were first cooled and then packed in similar cartons, made a fifty-hour journey without spoilage.

This new method has none of the disadvantages attached to the transporting of lobsters in barrels packed with ice, and avoids the possibility of the crushing or drowning of the creatures and the constant need for replenishment of the ice. In addition the total weight of the package is considerably reduced.

Similar experiments carried out with shrimps were equally successful.

For Milk Deliveries

The interior of the dairy body illustrated above and supplied by Eccles (Birmingham), Ltd., is fitted with steel racking to take 36 twenty pint bottle crates of milk. Framed in best quality hardwood with exterior panels of aluminium alloy, the vehicle is fitted with sliding doors to each side giving full access to all parts of the body.

Aerodynamic Dust Collector

Capable of use in any situation where dust-laden air or gases have to be cleaned, a new aerodynamic dust collector produced by Musgrave and Co., Ltd., combines high dust collecting efficiency, which remains constant irrespective of size, and low resistance with a corresponding low power consumption.

The filter surface consists of a cone-shaped slotted sheet over which air is passed at high velocity. Due to the slots, aerodynamic forces are set up, the resultant force suspending the dust particles in the form of a thin cloud layer immediately in front of the filter surface, while the clean air escapes through the slots. Dust thus separated is swept by the air current to the apex of the cone, passes through a secondary collector and is finally precipitated into a receptacle. Dust not caught in the secondary collector is carried back to the inlet and has to pass through the system again.

Both static and rotary models of the collector are available for special application.

New Factories

With a total floor space of 36,400 square feet, a new factory is to be built at Dovercourt, Essex, by the Standard Yeast Co., Ltd.

▪

A new manufacturing unit equipped with modern plant has been installed by the Craigmillar Creamery Co., Ltd., at Bromborough Port, Cheshire, where margarine production is now going ahead. The registered office will now be at 28, North Bridge, Edinburgh, 1, with the London office remaining at Unilever House.

T. Wall and Sons, Ltd., have taken over the premises at Craigmillar.

Machine Tool Exhibits

A direct-on starter of interest to those concerned with the starting and protection of machines driven by electric motors of up to about 10 h.p. was included in the exhibits of George Ellison, Ltd., at the Machine Tool and Engineering Exhibition held at Olympia recently. The protection afforded to motor, machine, and operator by automatic releases on starters was demonstrated, while the working of the automatic overload release mechanism was shown by a large-scale working model.

"Operation Wall's"

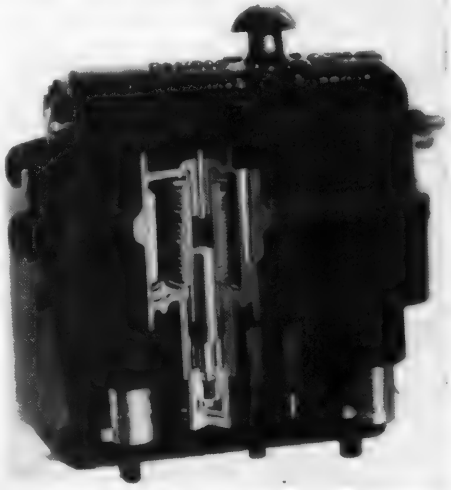
Special arrangements have been made for a supply of raw materials from N.A.A.F.I. so that T. Wall and Sons, Ltd., can ensure that nearly 20,000 boys of the Army Cadet Force and Junior Training Corps who go into camp all over England this summer shall be supplied with at least one ice cream daily.

Cellulose Tape Foils Thieves

The present number of thefts of goods transported by rail calls for the greatest precautions in packaging, and the use of transparent self-adhesive cellulose tape to cover labels and seal packages is an effective method of protection.

If a false label is stuck on top of an original label covered in this way, an overlap of tape shows; if the tape is removed first, the surface is torn, showing that the package has been tampered with.

One method used by thieves is to break open packages and remove some of the contents. The cartons are then damaged and the label obliterated to make it appear that the consignment has been damaged in transit and some of the goods have fallen out. The use of cellulose tape makes obliteration of the label difficult and as an additional seal on all joins it makes it doubly hard to damage the carton in such a way as to hide the theft.



"Bantam" starter cut away to show the solenoid overload release and the mechanism of the patent triple-action time lag.

New Branch Office

A new branch office was opened by J. H. Fenner and Co., Ltd., on August 3 at Whitcliffe Road, Cleckheaton, Yorks. Telephone: Cleckheaton 891 (2 lines).

The new branch will be under the management of Mr. M. Arnold. Mr. J. E. Fryer, who has represented the company in the West Riding for a great many years, will continue to serve in an advisory capacity.

Catching Oysters by Machinery

Mechanical fishing will be one of the development measures practised at the oyster beds on the Essex coast which have been acquired by the Ministry of Agriculture and Fisheries in their attempt to expand the oyster industry. Experiments will be made with mechanical dredges worked on winches to compare the cost and efficiency of mechanical and non-mechanical fishing. Fit oysters will be transferred for the purpose of the scheme from pest-free beds at the North Wales experimental station and a special study will be made of methods of eliminating serious pests such as the slipper-limpet larva.

Raspberries from New Zealand

As a result of a recent visit of Dr. C. H. Cadman of the Scottish Raspberry Diseases Investigation to New Zealand to assist in the control of virus diseases there, virus-free stocks are to be sent to Britain for experimental work and for use as a nucleus stock for the creation of virus-free nurseries.

Varieties which have been discarded in Britain owing to their susceptibility to disease are being grown in the main soft fruit growing areas in New Zealand where they have been disease immune for as long as thirty years, and yield about 2 tons of good quality raspberries per acre. New Zealand may thus become a nursery source for soft fruit production, stocks being brought to Britain and planted in disease-free areas for later commercial planting throughout the country. This would ensure a continuing supply of good quality berries for canners and jam manufacturers.

Oil from Herrings

The successful operation of the herring-to-oil conversion scheme, which is to receive a further grant in the Supplementary Civil Estimates, will mean a valuable addition to home oil resources, although at first the output may be earmarked for official food purposes. As supplies increase, however, oil will be available for the manufacture of feedingstuffs, chemical products, paint and oil, and other industrial purposes.

National Census of Distribution

The first National Census of the distributive and service trades will be taken in 1950 in respect of the year 1949. This census will be taken under the Statistics of Trade Act, 1947, and, as required by the Act, the President of the Board of Trade has set up a committee for the purpose of advising on the preparation of the forms and instructions necessary for the taking of the census. The President has stated that, in order not to place more burdens on traders than are necessary, the committee will be asked to consider, in the light of information obtained from the Pilot Census, how the forms may be made easier to complete while at the same time eliciting the information which should be collected at a first census of this kind.

The committee will be under the chairmanship of Mr. J. Stafford, Director of Statistics to the Board.

A selection of food products showing modern packaging and design.

Caterers Organise

Started in 1947, the Industrial Catering Managers' Association of Great Britain is the only national association of its kind which caters among its membership for all catering managers and manageresses of industrial canteens, municipal and institutional organisations. Its support of and representation on the National Council for Hotel and Catering Education, among whose counsels it is so necessary that the views of that section represented by the Industrial Catering Managers' Association should be expressed, thus fills a gap which formerly existed on the industrial side.

"Sales Management" Exams.

In May, 1948, over 500 students in the United Kingdom sat for the Qualifying and Final Examination in "Sales Management" conducted by the Incorporated Sales Managers' Association.

Results of these examinations were available on August 1, 1948, and in order to meet the convenience of many students the Association has agreed to hold a second examination in 1948 on December 2, 3, and 4.

Full particulars of these examinations may be obtained from the Secretary, 23, Bedford Square, London, W.C.1.

East Malling "Members' Day"

A popular "Members' Day" for amateurs was held by the East Malling Research Station on July 3. The programme began with a talk on summer pruning by Dr. A. Beryl Beakbane, and the methods she described were then demonstrated in various parts of the fruit gardens at Bradbourne House by members of the research staff. This was followed by a talk on fruit thinning by Mr. A. P. Preston, who outlined the reasons for thinning fruit and demonstrated a method of thinning. A tour of the amateur gardens planted in the winter 1943-44 was made and attention was drawn to the crops carried in 1946 and 1947. After tea, general questions were asked and demonstrations given on individual problems.

Booklets Received

The condensate return system is the one device for economising fuel which is common to all kinds and sizes of steam-using plants, and in their *Technical Bulletin* No. 17 the Spirax Manufacturing Co., Ltd., have attempted to show how and why condensate should be returned to the boiler plant, giving a description of the technical problems that are involved. An important section of this illustrated booklet covers methods of utilising condensate as boiler feedwater and the subject of condensate lifting installations, while the closing chapters deal with the functions of pipe strainer, sight glasses, and check valves.

■

Resistance to water vapour penetration is one of the most important functions of packaging materials, and in the latest issue of the *Patra Journal* a method of testing such materials for this property, together with a classification of a number of typical packaging materials according to their resistance to water vapour penetration when they are creased and uncreased, is given.

●

The growth and development of their business, its various products and financial expansion are all portrayed in a booklet recently published by W. and T. Avery, Ltd. The publication, which is profusely illustrated, contains an account of production at home, followed by notes on overseas activities. The firm, who commenced business in Birmingham in 1730, have extended their activities to include the manufacture of static and dynamic testing machines, equipment and fittings for shops and stores, refrigeration units, petrol pumps, milk processing, and ice cream machinery.

●

The wide range covered by the containers manufactured by Pearlite Box Co., Ltd., who are opening new factories in Manchester and London, is illustrated in their latest brochure. Used for packing frozen foods, confectionery, ice cream, bakers' sundries and medicinal products, the containers are made according to requirements and are impervious to heat, cold, damp, grease, and odour.

OBITER DICTA

● Perhaps we can never attain perfection in this world, but one thing is certain, it is never found in a food office.—*Solicitor for the Defence at Beaumaris Magistrates' Court.*

● When my wife tells me what she has paid for a lettuce or a cauliflower, I wonder if it is gold-mounted and hesitate as to whether I should really eat it or not.—*Treasurer J. Steel, of the Crail Town Council.*

● Snoek, as I may have mentioned before, has for me the delicate tang and relish of a pile of sawdust damped with a solution of sour vinegar and diluted creosote. — *Cassandra in the "Daily Mirror."*

● The quantity of food can be maintained by serving an extra sandwich containing a proportion of bread and filling derived from reducing one of the other sandwiches.—*From a Ministry of Agriculture circular.*

● Fruit and vegetable retailers say that they are being told by wholesalers: "Open your mouth and we will shut your shop."—*Alderman Wright Robinson, chairman of the Manchester Food Control Committee.*

● In view of the fact that Birmingham is grossly under-supplied with fish and chip shops, will the Parliamentary Secretary explain why the Ministry has consistently refused to allow the opening of new fish and chip shops in Birmingham, which is grossly under fish and chip shopped?—*W. L. Wyatt, M.P.*

● Last evening, in a short interval between listening to the Government's reply to the debate in regard to another matter, an hon. friend and myself tried to refresh ourselves. We found we had the choice of the alternative dishes of beaver or whale, a very curious diet for Members of this House and for the country as a whole.—*Major Sir Thomas Dugdale, M.P.*

● We are all supposed to eat a peck of dirt before we die. I would rather have a peck of dirt than eat a loaf from which the gases have not been allowed to escape.—*Mr. C. Ambrose, managing director of a bakery firm in a debate on bread wrapping at the Croydon Chamber of Commerce.*

Company News

As a result of Argentina's fiscal and export policies, the Bovril group have had drastically to curtail their meat extract shipments with the possibility in time of a cut in U.K. production unless the position improves. However, rapid expansion in the profits of the subsidiary, Argentine Estates of Bovril, which is accounted for by the inclusion in this year's figures of delayed cattle sales, has made possible the payment of 4½ per cent. on the 9 per cent. non-cumulative preferred ordinary capital.

●

At the fiftieth ordinary general meeting and the adjourned forty-ninth ordinary general meeting of Hovis, Ltd., held recently in London, the chairman, Mr. A. H. Dence, J.P., announced the attainment of the firm's jubilee after fifty years of service. While the accounts for the year ended March 31, 1948, were not yet completed, the payment of the usual final dividend of 10 per cent., less tax, making 20 per cent. for the year, was recommended.

■

The directors of the Midland Bank, Ltd., have announced an interim dividend for the half-year ended June 30 last at the rate of 8 per cent. actual, less income tax.

●

The payment of a final dividend of 20 per cent. and a cash bonus of 5 per cent., both less tax, which, together with the interim dividend of 7½ per cent. already paid, make a total of 32½ per cent., was recommended at the annual general meeting of Smith's Potato Crisps (1929), Ltd., held recently.

●

The amount paid by way of dividend during the year ended March 31, 1948, had been increased by some £44,000, it was stated in the thirty-sixth annual report of C. and E. Morton, Ltd. The principal company of the group, Beecham Group, Ltd., to whom 97½ per cent. of this dividend was payable, had elected to be charged for Profits Tax as a group and had provided a sum to meet the company's share of the Profits Tax liability of the group. Beecham Group, Ltd., do not intend to increase their own dividend distribution.

News from Overseas

Cruess will Continue Research

A recent news release concerning the change in chairmanship of the Division of Food Technology, University of California, was misleading in that it indicated that W. V. Cruess, the present Chief of that Division, would retire from active duty on July 1.

Prof. Cruess will not retire, but will continue on full-time status in research, teaching, and public service, as in the past. However, on relinquishing the chairmanship in favour of Dr. E. M. Mrak it is expected that Prof. Cruess will have more time for research on food processing and preservation. The change in status was made at his specific request.

B.W.I. Microbiological Research

The opening of a new Colonial Microbiological Research Institute at Port of Spain, Trinidad, British West Indies, took place on July 5. This centre will provide for fundamental microbiological research in the tropics, post-graduate training for students, and will assist agricultural and food industries generally.

George Ellison Ltd.

Having terminated their agency agreement in Johannesburg, George Ellison, Ltd., announce that future sales of Ellison Switchgear and Tufnol in South Africa and the Rhodesias will be handled by George Ellison, S.A. (Pty.), Ltd., who have opened offices at 33, Stability Unit House, Simmonds Street, Johannesburg. The Ellison representation in Natal and for South African Collieries will remain in the hands of F.G. Licence (Pty.), Ltd., Durban.

Mr. S. J. C. Wells has been appointed manager of George Ellison, S.A. (Pty.), Ltd. Born in South Africa, Mr. Wells received his training as an electrical engineer in England. He has been connected with the Ellison Organisation in England and South Africa for nearly twenty years and is well known to many friends of the company in both countries.

Cheap Sardinian Cheese

The complaints of the producers of cheap cheese in Sardinia that the minimum of 1,750 dollars per ton, which the Government had fixed for exports, prevented them from selling in America, have had their effect, and the Italian Ministry of Foreign Trade has now lowered this price to 1,100 dollars for consignments sent to the dollar areas only.

Danish Refrigeration Plant

A refrigeration plant, which it is believed will be the biggest in Denmark, is to be erected shortly at Esbjerg on the west coast of Jutland, and will be capable of storing 10,000 carcasses.

Hitherto Denmark has exported whole carcasses, but as soon as the new plant is ready it will be possible to export carcasses in sections, and it is expected that this will result in considerable savings in freight expenses.

U.S. Cereal Exports

Several cereal products were removed from the U.S. Commerce Department's positive list of commodities in short supply on July 9 and the products may now be shipped without validated export licences to any destination outside the European area.

The cereal products include malt, maize, meal, hominy and maize grits, macaroni products, oatmeal, edible soya flour, maize flour and corn starch, wheat cereals to be cooked, pearl barley, and buckwheat.

Licences will continue to be required for their shipment to Europe and adjacent islands, French North Africa and Turkey and the Soviet Union in Asia. Except for malt, these products are already on a "general" licence for destinations in the Western Hemisphere and the Philippines.

The reason for removal of the commodities from the positive list is general improvement of cereal supplies throughout the world and the present favourable crop forecasts in the United States and Canada.

New Approach to Living Standards

WIDE SCOPE FOR DISCUSSION

The United Nations Scientific Conference on the Conservation and Utilisation of Resources, to be held in the United States in May-June, 1949, under the authority of the Economic and Social Council of the United Nations, represents a new approach to one of the objectives of the United Nations, the promotion of economic development and higher standards of living throughout the world by a free exchange of ideas and experience on the conservation and utilisation of resources.

In its plenary meetings, comprising approximately half of the programme, the conference will examine the contribution of improved techniques to the alleviation of shortages of mineral resources, fuel and energy, and food and forest products. A series of plenary meetings will be devoted to questions of particular importance to underdeveloped countries.

Specific problems and techniques will be placed on the agenda of specialised section meetings which form the other half of the programme. At these meetings specialists will discuss conference papers on subjects such as forests, water, fisheries and wild life, fuel and energy, power, mineral resources; and the interrelated group of subjects included under soils, crops, grazing and livestock resources.

Technical developments will be selected for discussion according to the importance of their practical contribution, actual and potential, to economic development, and will be treated so as to interest the economist as well as the scientist, administrator, and engineer.

Globule Beet Machine

A new machine has recently been developed by the American Canning Machinery Corporation for the making of small beets from inexpensive large vegetables and fruits. The machine, known as the globule beet machine, works in conjunction with standard equipment.

The vegetables and fruits are prepared in the usual manner by scalding, peeling, and trimming. The larger sized beets are then diced into one-inch cubes and conveyed to a grader. This is divided into two sections; the first removes the imperfect cubes or "chips" which are recovered by the second section for subsequent use such as cut beets, dehydrated foods or "specialities." The perfect cubes are then discharged into a conveyor and fed into a machine where they are finally rounded into spheres. The finished pieces are then washed and inspected, after which they are ready for canning.

National Fruit Exhibition

All regions of Italy were represented at the Twelfth National Fruit Exhibition held at Verona on August 7, 8, and 9, one of the interesting features of which was a display of little-known as well as new varieties of peaches. The show was accompanied by a fruit and vegetable culture convention which dealt with the role of this branch of agriculture in the feeding of Europe.

Flying Fruit and Vegetables

During the 1946 boom in Italian exports of fruit and vegetables to England many producers had recourse to transport by aeroplane. The practice was continued in 1947 and during the period from April to August some 1,600 tons of products were transported, of which about 1,150 tons came to England.

The scheme was satisfactory in many respects and helped to prevent the loss of a considerable quantity of fruit and vegetables, but unfortunately the high cost of air transport limited it to the carrying of the more costly products such as strawberries, peaches, apricots, and early vegetables.

Costs would be lower if it were possible to avoid the fruit-carrying aeroplanes returning to Italy empty, and there are some English products which could be sent to Italy by air, but the very nature of fruit and vegetables makes any sort of regular timetable impossible.

While this position continues no great development can be expected in aerial imports of Italian fruit and vegetables, but it should be possible to find some merchandise whose transport would cover the cost of the return trip of the fruit-carrying aeroplanes.

Electronic Egg Grader

Electronic apparatus for indicating the degree of freshness of eggs is more effective than candling. (See also FOOD MANUFACTURE, 23, 3, 106.)

Portable Refrigerator

The Kold-Pak is a portable automatic unit which takes over where the home refrigerator leaves off. Measuring 22" × 14" × 15", it is large enough to hold several days' supply of perishable food, and weighs no more than the average packed suitcase. Current can be supplied from a 6-volt car battery or household electric current, the 1/15 h.p. motor operating only fifteen minutes every hour.

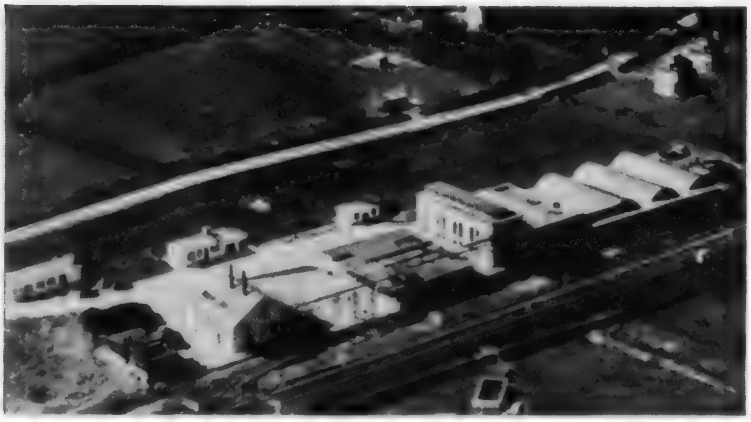
Ceylon's Coconut Oil Plan

Plans are now going ahead for development of Ceylon's oil processing industry, and final specifications are being prepared for a wide range of plant capable of adaptation to a variety of oil seeds.

The scheme provides for the processing of about 200 tons of copra per day by up-to-date methods which will produce a high yield of good quality coconut oil and a valuable cattle-feeding product.

About 100 tons of the residual pulp (poonac) per day will be further processed by local industries to yield a crude oil, and recovery from the latter will be as high as 14 per cent. This inferior oil will be converted into a high-grade fatty acid for the soap and allied industries, and for the recovery of glycerine.

The project also envisages the production of fatty alcohols, and refinement and hardening of the coconut oil with a view to enhancing its value in the world market.



The new Fry-Cadbury factory from the air. The chief buildings from left to right are the boiler house, receiving deck, main processing block, and stores. *Photo courtesy "The Bournville Works Magazine."*

Milk Chocolate Factory

Exploration of alternative sources of supply of milk necessary for the production of milk chocolate has led to the establishment of a new Fry-Cadbury factory at Rathmore, Co. Kerry. The factory, which was formally opened in June by Mr. Daniel Morrissey, T.D., Minister for Industry and Commerce in the Eire Government, is the third the firm have set up in Eire and is situated in the centre of a developing milk area close to the Blackwater river, the waters of which are used in processing.

The new concern is engaged in the first process of milk chocolate production and a great deal of the output of "crumb"—partially condensed or evaporated milk mixed with ground cocoa beans and sugar—will probably be absorbed by the parent company in England.

Between 80 and 90 men are employed in the factory, which embodies all the most modern equipment and possesses a laboratory for the testing of milk samples, storage tanks, and refrigeration plant for milk in addition to the main processing plant.

Nicholas Appert Award, 1948

The presentation of the Nicholas Appert award to Dr. Conrad A. Elvehjem, professor of agricultural chemistry at the University of Wisconsin, was made at the eighth annual conference of the Institute of Food Technologists held in Philadelphia from June 6 to 10.

Italian Macaroni

In normal times the consumption of macaroni and similar products in Italy amounted to some 1,500,000 tons yearly, but the rationing system has considerably reduced this figure. The factories existing in Italy, however, have a productive capacity of 2,000,000 tons yearly and efforts are being made for the renewal of exports to such possible markets as Belgium, Denmark, Egypt, France, Great Britain, Middle East, Norway, Holland, Sweden, and Switzerland.

Frozen Food Service

Americans, already well supplied with time- and labour-saving devices, are being offered a home delivery service for frozen foods.

The firm giving the service installs a frozen food cabinet in the house, fills it with enough frozen foods to last ten days and replenishes the larder every week. The firm telephones the housewife to suggest a selection of frozen foods for the following week and the next day a refrigerator van arrives with the food.

New Vitamin E Product

A new vitamin E product, introduced by Distillation Products, Inc., is the first alpha-tocopheryl acetate concentrate to be commercially prepared from vegetable oils. Each gram of the solution contains 250 milligrams of d, aplha-tocopheryl acetate. The company's bioassays indicate a biological activity equivalent to about 340 International Units of vitamin E per gram of concentrate. Designated "Type VI Vitamin E Concentrate," the product, which is available for immediate shipment, is priced at approximately 29 per cent. below the cost of previous concentrates on the basis of its vitamin E activity.

Empire-Wide Chain of Factories

PLAN FOR PRODUCING FOODSTUFFS

Visiting New Zealand as part of an extensive Empire tour, Major-General John Buckley, chairman of the food companies operating within the Beecham manufacturing group, recently arrived in Auckland, where, in conjunction with Mr. J. R. Butland, he will examine the possibility of adding a New Zealand link to a proposed Empire-wide chain of manufacturing units producing foodstuffs. The scheme is intended to co-ordinate the production of a large group of factories and to handle export surpluses on a more rational and direct basis. It is hoped that these manufacturing units will, in the aggregate, satisfy the requirements for a wide range of canned, bottled, and packed goods, and, at the same time, furnish a reservoir from which supplies for the Empire and world markets can be drawn directly.

The plan normally involves the development of existing plants to work in co-ordination with the London group, but retaining detailed control locally. Two very large units are now operating in South Africa, a company has been acquired in Australia for development on similar lines, and it is expected that Canada's food industries will also be represented. With its decentralisation, the scheme will enable purchasing countries to be supplied directly from the particular Dominion which can most efficiently provide the required goods, and will avoid a good deal of re-exporting from Britain.

News from the Ministries

Import Restrictions

A new consolidated list of import restrictions has been issued by the Board of Trade. This incorporates all amendments made to the former list which was issued in March, 1947, in so far as they are still operative.

Anyone wishing to obtain copies of this list which is called "Control of Imports into the United Kingdom, Notice to Importers No. 292" should apply to the Import Licensing Department, Board of Trade, 189, Regent Street, W.1. (Tel.: REGent 4090).

New Season's Jam Prices

Owing to the higher prices ruling for home-grown fruit this season, the Preserves Order, 1947, has been amended to prescribe revised maximum prices of some of this season's soft fruit jams manufactured in the United Kingdom. The new Order came into force on July 18, 1948. The maximum prices of other home-produced jams and marmalade are unchanged.

Article 14 of the Preserves Order concerning proceedings in respect of alleged deficiencies of weight is revoked. In future, such deficiencies will be dealt with under Article 8 of the Labelling of Food Order, 1946, which applies to all pre-packed foods.

Kippers and Herrings

After consultation with the Fisheries Departments and the Herring Industry Board, the Minister of Food has made The Fish (Control and Maximum Prices) Order, 1947 (Amendment No. 8) Order, 1948. This Order varies the processors' and distributors' margins on fresh herrings and kippers, and frees pickle-cured herrings from price control. The maximum first-hand prices of herrings are not affected.

The amending Order also revokes, from August 1, the provisions in the Fish Maximum Prices Order prohibiting the sale of immature fish for human consumption and prescribing a maximum price on their sale to a mealworks or as bait.

Canned Tomatoes

An amendment affecting the price of canned tomatoes will be made to the Canned Fruit and Vegetables (No. 2) Order, 1946 (Amendment No. 4) Order, 1948.

A reduction will be made in the maximum prices of No. 3 size cans and new prices will be prescribed for 500 and 600 gram cans. The prices of No. 2, No. 2½, and No. 10 cans will be unaltered.

Pulse Prices

The Pulse (Control and Prices) Order, 1943, has been further amended to give effect to the announcement made in December last year that the average price to the grower of threshed home-grown peas of the 1948 crop would be increased by 4s. per cwt.

As a consequence of the increase in the grower's price the maximum wholesale selling prices of hand-picked peas, home-grown split peas, pea pickings sold for human consumption, imported dried peas, and green split peas milled from imported peas are increased by ¼d. per lb. at each stage.

Meat Products and Canned Meat

An Order which came into force on July 4 revokes and supersedes the Meat Products and Canned Meat (Control and Maximum Prices) Order, 1947, as amended.

The following are the principal changes introduced by the new Order, which is, in the main, a re-enactment of the Order it replaces:

(i) Price control is removed from imported salami sausage.

(ii) Ravioli is included in the list of "excepted products," which means that there is now no restriction on its manufacture.

(iii) Imported canned Vienna sausage, pork fillets, and chopped lunch tongue are removed from the Schedule of Imported Canned Meats subject to price control as they are no longer being imported by the Ministry.

(iv) Maximum prices are prescribed for two new types of imported canned products—beef or Oxford sausages (1 lb. tins) and luncheon beef with cereal (12 oz. tins).

Fruit Pulp Order

Following the freeing of soft fruit from price control this year, an Order has been made removing United Kingdom soft fruit pulp from price control as from July 18, 1948.

The new Order retains the provisions relating to the licensing of fruit pulp manufacturers and the keeping of records by such manufacturers. Licences granted under the old Order remain in force.

Tare Allowance

Quarters of beef from New Zealand are occasionally found to be wrapped in unusually heavy hessian, and test weighings have shown that the normal allowance of 1½ lb. is insufficient for these heavier wrappers.

Arrangements have therefore been made for a special tare allowance when wrappers from New Zealand quarters of beef are found to be unusually heavy, say over 2 lb.

Token Imports from Norway

Norway has now been added to the list of countries participating in the Token Import Scheme. Countries already participating are Australia, Belgium, Canada, Denmark, Finland, France, Holland, India, Italy, Luxembourg, Pakistan, Sweden, Switzerland, and the United States.

Fruit and Vegetable Imports

The Minister of Food, in agreement with the President of the Board of Trade, announces that the period of validity of open individual licences issued this year in respect of imports of fresh fruit and vegetable produce has been extended to December 31, 1948. The necessary arrangements with H.M. Customs and Excise have already been made and licences need not be returned to the Board of Trade for amendment.

"Nutrex" Bread

"Nutrex" bread has been added to the list of breads which may be sold free of price control provided the seller has national bread for sale at the same time.

Food from New Zealand

SEVEN-YEAR CONTRACT FOR DAIRY PRODUCE

Agreement has now been reached in London between the Minister of Food and the New Zealand Dairy Products Marketing Commission for the purchase by the United Kingdom of butter and cheese from New Zealand covering production to July 31, 1955. The old contract was due to expire on July 31, 1950, and the two unexpired years of this contract have been incorporated in the new one.

The prices for the 1948-49 season will be 235s. sterling per cwt. f.o.b. for butter and 133s. sterling per cwt. f.o.b. for cheese.

An important feature of the new agreement is that prices for the following seasons will be subject to annual review with maximum variations in any season of 7½ per cent. above or below the price for the preceding season. This is to provide some measure of stability for both buyer and seller and thereby to encourage increased production.

The quantity also is subject to review annually between the parties and the quantity to be supplied during the 1948-49 season will be 97 per cent. of the exportable surplus.

Feedingstuffs Order

An amendment to the Feedingstuffs (Maximum Prices) Order, 1948, operating from August 1, 1948, has been made. The amending Order increases the maximum prices of wheat, oats, rye and various other products, when sold as animal feedingstuffs. These increased prices result from the recently announced changes in prices to be paid to farmers for home-grown grains from August 1, 1948.

The following list shows the items affected:

Imported wheat.
Imported oats.
Imported rye.
Reconditioned wheat.
Wheat screenings.
Wheat (other than reconditioned wheat), cut or kibbled.
Wheat (other than reconditioned wheat), flaked, rolled, crushed, or ground.
Reconditioned wheat, flaked, rolled, crushed, or ground during reconditioning.
Reconditioned wheat, flaked, rolled, cut, kibbled, crushed, or ground subsequent to reconditioning.
Oats, clipped.
Oats, crushed or rolled.
Oats, cattle ground or cooked flaked.
Oats, Sussex ground.
Rye, cooked flaked.
Rye, rolled or ground.

There is no change in the general provisions of the Feedingstuffs (Maximum Prices) Order, or in the maximum prices of any feedingstuffs other than those listed above.

Frustrated Exports

It was recently announced that the Association of British Chambers of Commerce had undertaken to advise the Board of Trade regarding applications for permission to release for the home market frustrated export goods. These are goods which are stated to be shut out of the markets for which they were originally intended, and for which a buyer has not been found in alternative overseas markets.

The association has constituted the Advisory Panel as follows:

Mr. John McLean, C.B.E. (President of the Association).
Mr. A. H. S. Hinchliffe, D.L., J.P. (Deputy President of the Association).
Colonel R. H. Goldthorp, D.S.O., T.D., D.L., J.P. (chairman of the Overseas Committee of the Association).
Mr. J. K. Tyre (member of the Executive Council of the Association and of its Overseas Committee).

In reaching their conclusions, the Advisory Panel will draw upon the large reservoir of expert commercial opinion available to it throughout the United Kingdom. Information supplied by applicants will be treated confidentially.

Applications should not be addressed to the Advisory Panel; they should be forwarded to the Government Department which is the Production Authority for the goods in question or, in the case of goods imported for re-export, the Import Licensing Department of the Board of Trade.

Export Licensing Branch

That section of the Board of Trade Export Licensing Branch formerly operating from 4, Fenchurch Avenue, has now been removed to: Regis House, King William Street, London, E.C.4. Telephone No.: Avenue 3111. The headquarters of the branch remain as at present: Stafford House, King William Street, London, E.C.4. Telephone No.: Mansion House 4555.

Olive Oil Imports

The Anglo-Spanish trade and payments arrangements have now been approved by the two Governments. These arrangements provide among other things for exports to the United Kingdom of limited quantities of Spanish olive oil.

Importers of olive oil from Spain, Greece, France, or French North Africa are reminded that all offers should be made direct to the Olive Oil Importers' Association at 11, Ironmonger Lane, London, E.C.2.

Fruit and Vegetables Publicity

In co-operation with associations representing all sections of the fruit and vegetables trade and industry, the Fruit and Vegetables Organisation has formed a Fruit and Vegetables Joint Publicity Committee, the aims of which are:

(*a*) To co-ordinate the publicity issued by the Agricultural Departments, the Ministry of Food, and the trade, with a view to encouraging greater consumption of fruit and vegetables when supplies are plentiful and should be cheap, and so avoid waste of good food.

(*b*) To secure the co-operation of retailers in making bargain offers of fruit and vegetables in plentiful supply.

(*c*) To advise housewives which varieties of fruit and vegetables are in plentiful supply so that they can plan their daily menus and their purchases for preserving, pickling, and jam making at a time when prices are moderate.

(*d*) To publicise new and established methods of preparing and preserving fruit and vegetables.

(*e*) To secure the co-operation of catering establishments in serving increased portions of fruits, vegetables, and salads when these are plentiful and cheap.

Information and Advice

Bottling of Onions

B.2677. *Can you suggest a method to prevent the clouding of vinegar in bottled onions?* (Lancs.)

The four usual reasons for cloudiness are:

(*a*) Use of raw onions (no lactic fermentation in brine).
(*b*) Use of onions that have had no water soaking prior to brining.
(*c*) Too low acidity in finished product.
(*d*) Leaky closure—or too large an airspace in the finished product.

The trouble is usually due to a combination of (*c*) and (*d*), for the bottle position is difficult and many firms are using jam jars which often vary considerably in width. A closure which tightly seals one may be extremely loose on another and if the acidity is low and the weather warm, a bacterial cloudiness results in a very short time in a case of this sort. The remedy therefore lies in having a really tight closure and achieving an overall acidity of 3·6 per cent. or more.

Black Puddings

B.2678. *Could you supply me with a recipe for black puddings using pearl barley?* (Scotland.)

The following recipe was given:

	Stock Seasoning.
16 lb. blood	2 lb. salt
8 lb. flare fat	8 oz. ground black pepper
1½ lb. pearl barley	1 lb. rice flour
1¾ lb. flour	4 oz. ground pimento
1¾ lb. fine oatmeal	4 oz. ground coriander
1 lb. onions	4 oz. ground mustard
	1 oz. celery seed

The blood must be perfectly fresh, and strained through muslin to remove the "strings." The barley is cooked in a cloth, allowing for swelling, for a period of about 4 hours; the flare fat is cubed and scalded in a wire basket, after which all surplus water is removed. The onions are chopped and lightly cooked. Seasonings (about 14 oz.), flour, oatmeal, and cooked barley are added to the blood and mixed well. Last of all the onions and fat are added, mixed again, and filled into bullock runners. The fat is distributed evenly, tied off into 1 lb. rings, and cooked for about forty minutes at 180° F. To test cooking, prick the skin, and if no blood oozes out the cooking is finished. The addition of some black-pudding dye to the water will ensure an attractive black finish.

Information Supplied

B.2616. *Suppliers of jam jar tops for fruit bottling.* (Norfolk.)

B.2617. *Sweetening materials as substitutes for sugar in the manufacture of pickles.* (Staffs.)

B.2619. *Recipe for a cheese spread.* (London.)

B.2620. *Names and addresses of manufacturers of maltose syrup.* (London.)

B.2621. *Recipes for the manufacture of cake, scone, and crumpet flours.* (Holland.)

B.2626. *Manufacturers of homogenisers.* (Belgium.)

B.2629. *Formulae for mayonnaise and salad cream.* (Lancs.)

B.2632. *Literature on jam manufacture.* (Lancs.)

B.2636. *Information on the manufacture of macaroni.* (Eire.)

B.2637. *Literature on custard powders and jelly powders.* (London.)

B.2639. *Potato crisp manufacture.* (Sussex.)

B.2641. *Suppliers of ammonium bicarbonate.* (Scotland.)

B.2642. *Suppliers of edible frying oils.* (Lancs.)

B.2645. *Locust bean gum suppliers.* (Ches.)

B.2646. *Names and addresses of suppliers of screw-cap jars.* (Warwicks.)

B.2647. *Manufacturers of machinery for filling and weighing baking powder and packing jelly crystals.* (New Zealand.)

B.2648. *Manufacturers of a bleaching agent.* (Dorset.)

B.2649. *Suppliers of sauce in bulk and information on tomato ketchup manufacture.* (Glam.)

B.2651. *Manufacturers of a machine for skinning and preparing onions for pickling purposes.* (London.)

B.2652. *Recipe for salad cream without eggs and information on the manufacture of sandwich spread.* (Northumberland.)

B.2653. *Manufacturers of filling machinery, washing machines, and aluminium containers.* (South Africa.)

B.2664. *Literature on biscuit manufacture.* (Singapore.)

B.2665. *Suppliers of labels.* (Yorks.)

B.2666. *Recipes for marshmallow cream and almond paste.* (London.)

B.2668. *Manufacturers of glass-lined jacketed tanks.* (London.)

B.2670. *Manufacturers of conveyor belting machinery.* (Eire.)

B.2672. *Suppliers of agar-agar.* (Holland.)

B.2673. *Machinery for the manufacture of peanut butter.* (Australia.)

B.2675. *Bottle suppliers.* (Northumberland.)

B.2676. *Poultry plucking machinery.* (Yorks.)

B.2680. *Suppliers of second-hand canning machinery.* (London.)

B.2681. *Manufacturers of machinery for fastening paper bags.* (Yorks.)

B.2684. *Literature on cereal manufacture.* (London.)

B.2686. *Suppliers of hydroquinone.* (France.)

Information Required

B.2663. *Suppliers of potato crisps in bulk.* (Yorks.)

B.2667. *Machine for the manufacture of artificial sausage skins.* (Yorks.)

B.2697. *Suppliers in this country of fine prepared flour salt for use in moisture-free sandwich fillings.* (Scotland.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

598,639. COFFEE MACHINERY DEVELOPMENT CORPORATION: Beverage package and apparatus.

598,661. PORTEUS, W.: Grinders and delivery systems for cereals and the like.

598,762. YOURSTON, J. C., and ANDERSON, G. S.: Grain drying apparatus.

598,769. JABLONSKY, B.: Refrigerators, cold storage rooms, and the like.

598,826. HAY, J. G., and WIESELTHIER, L. M.: Manufacture of bread, confectionery, and the like.

598,883. BLISS (ENGLAND), LTD., E. W., GEESON, R. E., and PERKINS, C. W.: Can seaming mechanism.

598,908. BAERWALD, F. K.: Preservation of food.

Abstract of a Recent Specification

Quick Freezing Plant for Fish and other Foodstuffs

The present invention relates to quick freezing plant intended primarily for fish, but also applicable for the preservation of other foodstuffs. The main object of the invention is to provide a simple construction of freezing plant which will operate with very great efficiency, and a further important object is to provide a plant which will not only operate on land but can also be operated on board ship, notwithstanding pitching and rolling of the vessel.

The invention is preferably applied to a plant wherein the cooling of the goods is produced by brine or other low-freezing-point coolant, such as trichloroethylene, maintained at a low temperature by a refrigerating plant of any normal and suitable type. The invention is, however, also applicable when the cooling action is produced directly in the freezer by a refrigerant, without the intermediary of a coolant.

The fish or other goods are disposed in relatively shallow layers, of say about 3 in. thickness, in a freezing chamber having heat-insulating walls, and while in said chamber the goods are cooled by direct contact with metallic coolant or refrigerant-cooled supporting surfaces on one surface of the layer, while the opposite surface of the layer is cooled by a current of cooled or refrigerated air passed thereover, with or without an intermediate metal layer.

By controlling the speed of the air current, working at a given low temperature, the freezing action of the air is subject to control, and may, for example, be equalised with that of the cooled metallic surface on the other side of the layer. This provides a method whereby any reduction in the cross-section of the air current due to increase in the thickness of the layer of goods, may be neutralised by increasing the speed of the air current, so that the same cooling effect is produced at all times by passing the same volume of air, at a given low temperature, over the goods in a given time. Means may of course be provided for protecting the goods from damage by the air current.

According to the main feature of the present invention, the improved quick freezing plant comprises a freezing chamber having a single loading and unloading door, and a tray supporting device within the chamber having a vertical series of supporting surfaces afforded by a hollow member or members through which a coolant or refrigerant is continuously circulated, while cold air is circulated through said chamber in a contrary direction, such supporting device being adapted for rotation about a vertical axis to bring any desired portion of the supporting device opposite to the loading and unloading door.

In one construction the supporting device may include a series of separate shelves formed by hollow discs mounted axially on a tubular spindle, with which the interiors of the shelves communicate and which is connected to a supply of coolant or refrigerant, but preferably the supporting device comprises a series of shelves formed continuously in Archimedean screw form.

The quick freezer chamber may be operated in conjunction with an external cooler, and there is a direct circulation of air through the freezing chamber and the external cooler which is cooled by a coolant or refrigerant, the direction of flow of air in the freezing chamber being preferably contrary to that of the coolant or refrigerant through the tray supporting device.

Preferably there are a pair of freezing chambers operating in conjunction with a common cooler which is operatively associated with either freezing chamber when loaded, while the other freezing chamber is being unloaded and reloaded.

598,744. *Sir Charles Dennistoun Burney, Bart., C.M.G.*

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" which is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

IVANHOE.—656,019. Canned meat and canned fish. **Trygve Olsen & Co. Aktieselskab** (a Joint Stock Company organised and existing under the laws of Norway), Verksgaten 13, Stranger, Norway; Merchants.

CHUM.—657,005. Dried fruit. **British Flour Products, Ltd.**, Crawford Road Mills, Crawford Road, Wigan; Manufacturers.

GLEN-VEETA — 658,301. Biscuits (other than biscuits for animals). **William Macdonald and Sons (Biscuits), Ltd.**, Glengarry Biscuit Bakery, Earl Haig Road, Hillington, Glasgow, S.W.2; Manufacturers.

New Companies

Crispies, Limited. (452647.) Britannia Mill, Miry Lane, Wigan. To carry on bus. of manufacturers of and dealers in potato crisps, nuts, fruit and dried fruit, etc. Nom. cap. £10,000 in £1 shares. Dirs.: T. E. Gallagher, 32, Carless Lane, Ince-in-Makenfield, nr. Wigan; J. Gallagher, Briarcroft, Chorley Road, Standish, nr. Wigan.

David and Howe, Limited. (452700.) 381, Victoria Street, Grimsby. To carry on at or from Grimsby or elsewhere the bus. of packers, importers, and picklers of eggs, etc. Nom. cap.: £25,000 in £1 shares (11,000 cum. pref.). Dirs.: C. Howe, Claremont House, Welholme Avenue, Grimsby; J. W. Worth Howard, 24, Weelsby Road, Grimsby; H. J. Marriott Smith, 37, Connaught Avenue, Grimsby (all permt.).

Reliance Cream Ices, Limited. (452747.) Nom. cap.: £100 in £1 shares. Dirs.: Not named. Subs.: Beatrice M. Johnson, 208, Sheringham Avenue, Manor Park, London, E.12 (Secretary); K. B. Lindsay, Malvern, Worcester Crescent, Woodford Green, Essex (acct.).

Power Master, Limited. (454240.) 372, High Road, Tottenham, London, N.17. To carry on bus. of designers and manufacturers of and dealers in freezing, refrigerating, and chilling plant and machinery, etc. Nom. cap.: £5,000 in £1 shares. Dirs.: C. A. Bryant, 27, Broadfields Avenue, Winchmore Hill; W. J. E. Lee, 64, The Chine, Winchmore Hill, London, N.21; Mrs. J. C. M. Bryant and Mrs. I. M. Lee.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.